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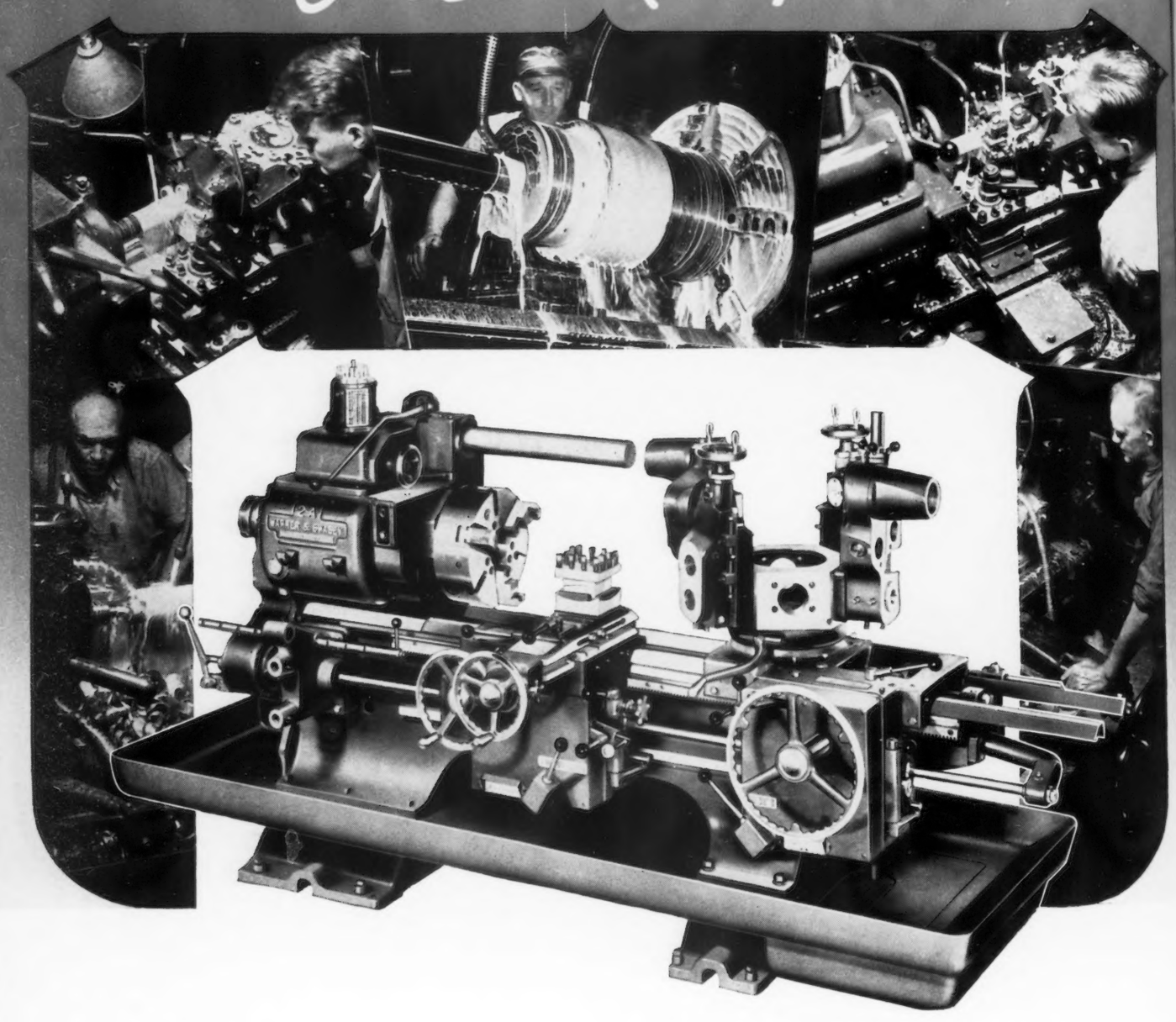

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Member, Audit Bureau of Circulations
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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year.
Single copy, 25 cents.
Cable Address, "Ironage, N. Y."

Owned and Published by
CHILTON COMPANY
(Incorporated)

Publication Office	Editorial and Executive Offices
Chestnut and 56th Sts., Philadelphia, Pa. U.S.A.	100 East 42nd St., New York, N. Y. U.S.A.

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The Iron Age

MAY 1, 1941

ESTABLISHED 1855

The Town Is Full of Strangers

IT can be conservatively figured that for every thousand new men going into growing manufacturing industries, there will be ten changes in executive positions. The factory manager will need a couple of more assistants, the production engineer is moved upstairs, foremen become department superintendents and the purchasing agent, hired away by a competitor, is replaced by another. So it goes, some moving up, some moving in and some moving out.

With five million new workers coming into manufacturing industry, this means 50,000 executives in new positions. And half of that number will be in our metal working industry.

Twenty-five thousand new acquaintances and friends to make! That's equivalent to ringing all of the doorbells in Ann Arbor, Mich., or Ithaca, N. Y. And it reminds me of a story.

Bill Jones went back to visit the home town after a three year absence. After three years in a big city where he did not know one person in a thousand, he looked forward to spending a week where he knew everybody.

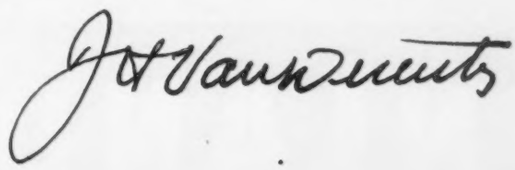
He wanted to see his old friend Joe, the station agent, and borrow a friendly chew of his plug tobacco. He wanted to slap the one man police force on the back and ask it about its seven kids. He wanted to say "howdy" to Mazie, the blond cashier at the Eureka House, whom he called "Toots" in bygone days.

First thing Bill did on arriving at the home station was to look for Joe. But Joe the station agent had been drafted and there was a new man in his place. Even Sam, the amiable driver of the ancient taxi, was gone and in his place was a stranger with a shiny six.

Driving along Main Street, Bill found that most of the stores had changed ownership and carried new and unfamiliar names. And stopping off at the Eureka House he discovered that "Toots" had left town a year ago to get married and now had twins.

Bill's father and mother had changed, too, but he could still recognize them. And the first thing he said to them was: "Gosh, the old town is full of strangers."

There may be a moral in this story for some of the sales and promotion executives who are slumbering in the somnolent sunshine of Uncle Sam's billions. In the days to come, when you *need* orders, you don't want to find your towns full of strangers. The time to make their acquaintance is before you have to sell them.



A Sound Raw Material Program Leads to INLAND QUALITY STEEL

One of the most important means used by Inland to produce steel of highest quality is a program which assures continuous flow of uniform raw materials. This Inland practice is illustrated by the great care taken in selecting, mixing and blending basic iron ore.

To assure uniformity and continuity of supply, Inland owns large ore reserves of known quality. These are mined by methods which avoid inclusion of impurities. Every car of ore, used by Inland, is sampled as it leaves the mine. When these cars are dumped into pockets at the upper lake docks, the highest and lowest in different elements are evened out with infinite pains by blending. Further mixing occurs when the ore flows into the steamer. The ore is mixed a third time during the process of unloading and piling at the mill. Again, when loading the skips that feed the Inland blast furnaces, the grabs that dig through the ore accomplish a final mixing.

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Screw Machine Steels

—An examination of the metallurgy, physical properties and performance of the commercial steels. All these data are particularly timely today with all energies now directed toward stepping up production.

By A. S. JAMESON
Metallurgist, International Harvester Co., Chicago

THE term "screw machine steels" is very general and would cover by one interpretation all steels cut on screw machines. For the purpose of this article "screw machine steels" will be defined as steels specifically prepared to produce a maximum machinability. In general, steels chemically made to produce maximum machinability, obtain machinability at the expanse of physical strength.

The steels fall into carbon classifications, medium at approximately 0.30 to .40 per cent carbon and low at approximately 0.10 to 0.20 per cent carbon.

There are four general plans which may be followed to increase machinability.

(1) The addition of sulphur and/or phosphorous.

(2) The control of micro-structure.

(3) Cold drawing.

(4) The addition of lead.

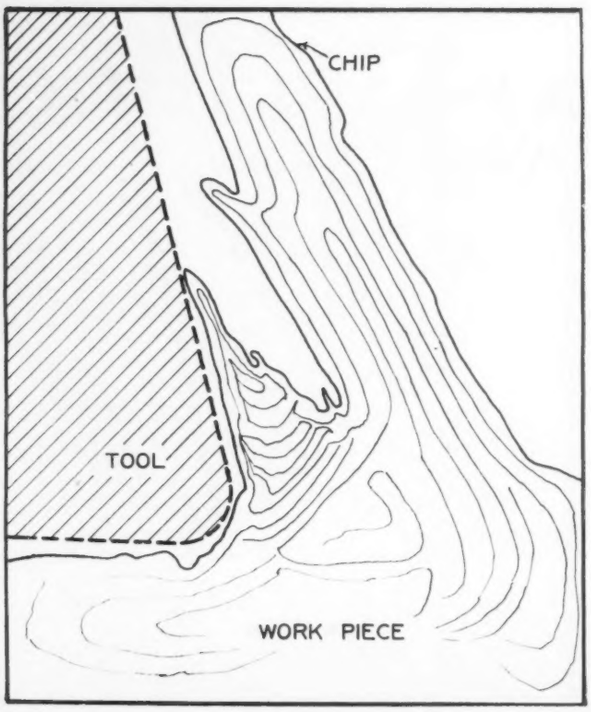
In discussing the items in the order named, it must be understood that the assumption is that they were logically arrived at by planning. This was, of course, not the case. For instance, bessemer steel, which has very good machining properties, was made before mass production demanded fast machining steels, and cold drawing was used for increasing strength and obtaining size control.

It might well be said at this point that the first three plans just mentioned reduce the plasticity of the metal. In machining, loss of plasticity leads to a chip which breaks easily from the parent body (work piece). From Fig. 1, it will be observed that the chip is not cut but forcibly torn from the parent body. A chip that breaks easily from the parent body makes for smoothness of finish, longer tool life and less power consumption. In machining low and medium carbon steels, the ferrite of the micro-structure is the constituent which prevents the formation of a free breaking chip, and it is also this ferrite which, when work hardened, wears the tool; its work-hardened state exerts a considerable resistance to the free passage of the tool.

Sulphur and Phosphorus

Consider first the addition of sulphur. Sulphur, when added to the steel in the absence of manganese, will form iron-sulphide (FeS) which has a tendency to segregate in envelopes at the grain boundaries. No doubt this steel might machine well if it could be rolled, but it cannot be rolled or forged. Actually, such steel is never met with, as sufficient manganese is always added to form manganese-sulphide (MnS), or more probably iron - manganese - sulphide ($Fe_3Mn_2S_5$) to insure hot workability. The $Fe_3Mn_2S_5$ is present in the form of an inclusion. This inclusion is located in the ferrite areas, as shown in Fig. 2.

These inclusions tend to break up



LEFT

FIG. 1 — Diagrammatic representation of a tool cutting steel.

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BELOW

FIG. 2—Photomicrographs of sulphide inclusions in ferrite. Nital etched and at 100 diameters. Cross-section (left) and longitudinal section (right).

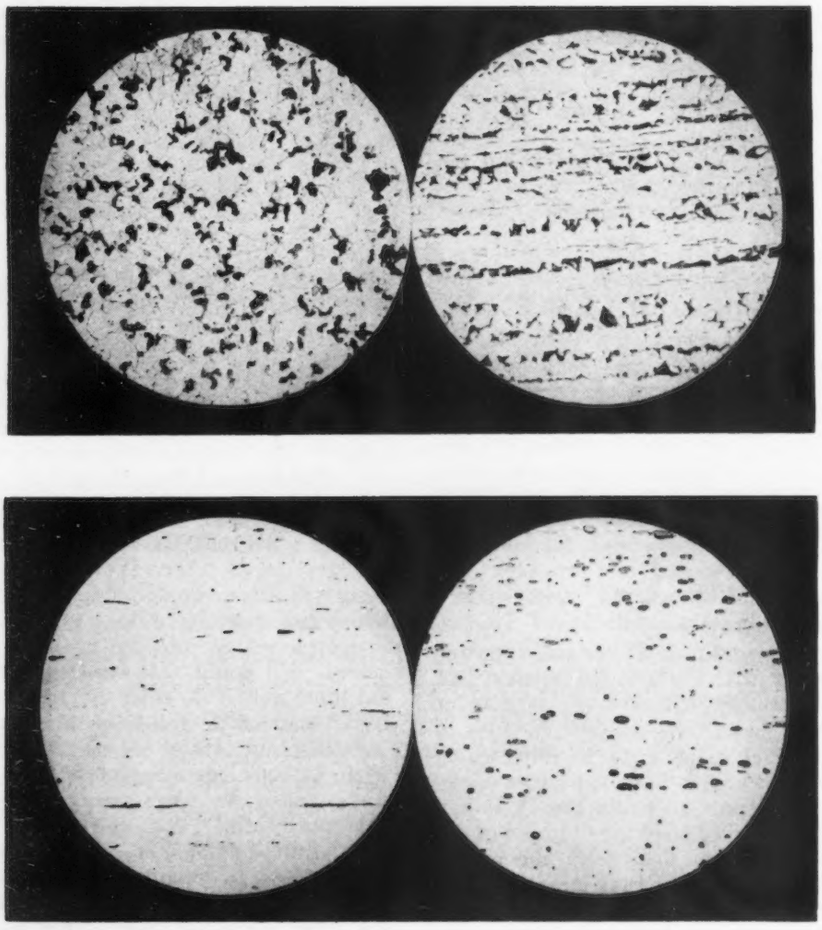

FIG. 3—Photomicrographs of inclusion in low carbon sulphurized steel. Longitudinal direction. Unetched and at 50 diameters. Undesirable (left) and desirable (right).

the continuity of the ferrite, and make it more brittle, therefore, more machinable. The silicon content of the steel is held to a low percentage, for the presence of silicates in the iron-manganese-sulphur inclusion, makes the inclusion highly abrasive thus causing excessive tool wear.

The presence of aluminum in the steel is also detrimental to the tool life as it forms an abrasive oxide inclusion.

In making free machining sulphur steel the inclusions should be of the type shown in Fig. 3.

Now as to the addition of phosphorus to steel. Phosphorus is present in steel as iron phosphide (Fe_3P), but unlike the sulphur does not occur as an inclusion but in solid solution in the ferrite. In solid solution it adds to the strength of the ferrite constituent and makes it more brittle, thus improving machinability. It reduces the solubility of carbon in iron. The effect of this will be discussed later. Phosphorus is not used to such a great extent in this country as is sulphur for improving machinability.

Before giving typical analyses containing sulphur and phosphorus, or both, some remarks might be made on manganese additions in excess of those required to satisfy the sulphur content. Manganese is added to high sulphur steels to improve the strength of these steels and thus offset the weakening effect of sulphur.

Bessemer screw stock also contains nitrogen, which has some effect in producing good machining properties.

Table I gives the chemical composition of typical screw machine steels.

In discussing the strength of the steels shown in Table I, first consider the factors which affect their strength, bearing in mind that screw machine steels have a strength requirement as well as a machinability requirement. The factors which cause an increase in the tensile strength of these steels are:

(1) Higher carbon content.
(2) Higher manganese content.
(3) Higher phosphorus content.
(4) Higher silicon.
(5) Lower sulphur.
(6) Cold working.
(7) Smaller grain size.

It will be noted that in many

instances in the analyses shown in Table I several factors are involved at the same time, some working to increase strength and others working to decrease strength. Table II shows average tensile properties of the steels shown in Table I in their cold drawn condition.

The loss of strength due to sulphur is not very noticeable in a direction longitudinal to the direction of rolling. The greater loss occurs in a transverse direction. Figs. 4 and 5 give the results of longitudinal and transverse tensile and impact tests on a sulphur steel, compared with those obtained from a steel of similar carbon content not containing over 0.030 per cent sulphur.

The direction tendency is evident in the longitudinal microstructure of screw machine steels, as shown in Fig. 6. It will be noted that in contrast to the plain carbon steel that marked ferrite banding is evident in the steels containing sulphur and phosphorus.

Experience in the application of screw machine steels is summarized in Table III.

As the low carbon screw machine steels containing sulphur and phosphorus are often applied to carburized parts, it should be interesting to consider their behavior in carburizing.

Phosphorus in the amounts present in these steels does not have any appreciable effect in retarding carbon penetration or in lowering the hardenability of the case. It, of course, does have the same embrittling effect on the carburized case as it has on the original material which would be the core of a carburized steel.

Sulphur, as it is mainly present as an inclusion does not affect the rate of carbon penetration but again its weakening effect is evident in the carburized case.

In general, the screw machine steels do not have the same uniform carburizing and hardening properties as do plain carbon steels. This is not due to the presence of sulphur or phosphorus, but is due to the melting practice which aims for a semi-killed metal. This means a high oxygen content, which is the element most detrimental to uniform carburizing and hardening. Fig. 7 shows the average carbon penetration and distribution for a few screw machine steel analyses. The addition of manganese to these

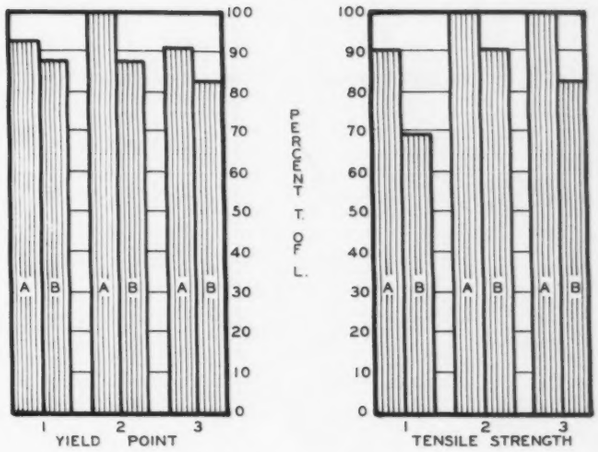

FIG. 4—Longitudinal and transverse tensile tests. A = carbon steel; 0.20 C, 0.52 Mn, 0.027 S, 0.014 P, 0.21 Si. B = sulphur-manganese steel; 0.20 C, 1.18 Mn, 0.100 S, 0.016 P, 0.21 Si. Heat treatment as follows: (1) water quenched from 1450 deg. F.; (2) water quenched from 1600 deg. F.; (3) water quenched from 1650 deg. F.; RQ 1450 deg. F. Treated in 0.5-in. test bar size.

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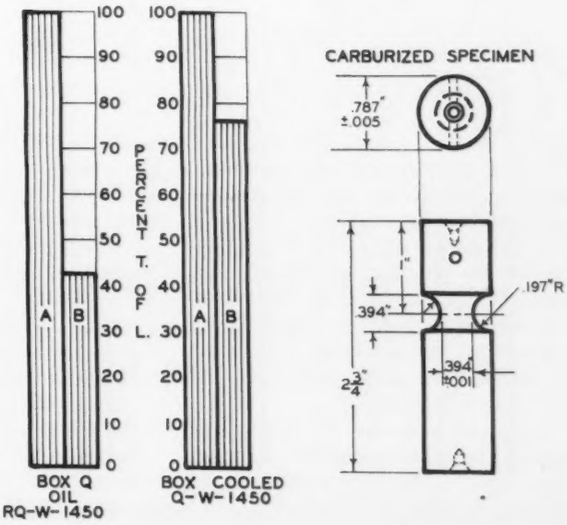


FIG. 5—Longitudinal and transverse impact tests. A = carbon steel; 0.20 C, 0.52 Mn, 0.027 S, 0.014 P, 0.21 Si. B = sulphur-manganese steel; 0.20 C, 1.18 Mn, 0.100 S, 0.016 P, 0.21 Si. Carburized at 1700 deg. F. for a case depth of 0.040 to 0.050 in.

o o o

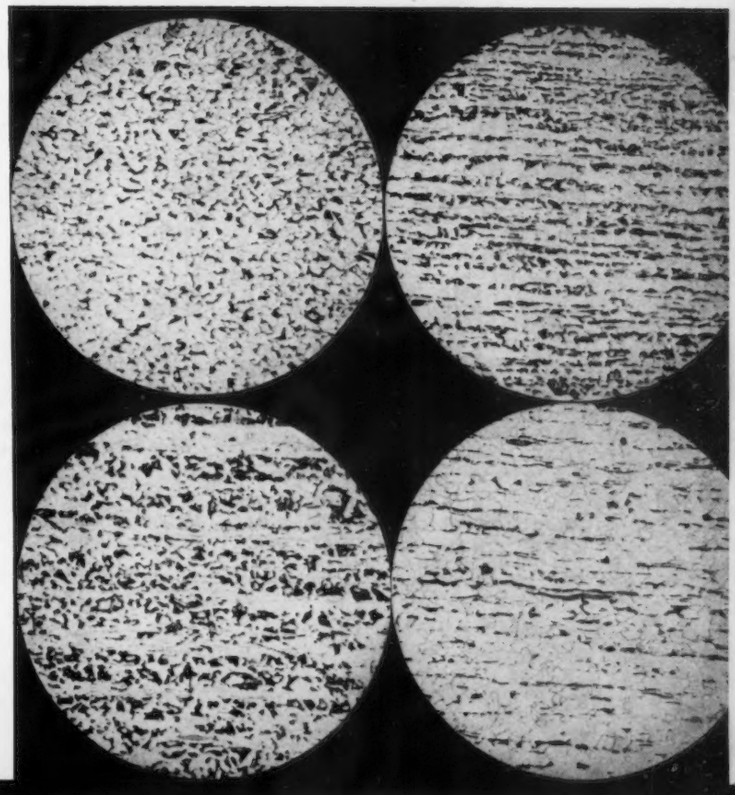


FIG. 6—Longitudinal microstructure of screw machine steel. Nital etch, and at 100 diameters. (Upper left) 0.15 C, 0.51 Mn, 0.033 S, 0.015 P, 0.25 Si; (upper right) 0.19 C, 0.89 Mn, 0.122 S, 0.014 P. 0.06 Si; (lower left) 0.14 C, 0.86 Mn, 0.204 S, 0.093 P, 0.02 Si; (lower right) 0.19 C, 1.22 Mn, 0.241 S, 0.017, P, 0.01 Si.

TABLE I

Chemical Composition of Typical Low Carbon Screw Machine Steels

Melting Practice	Chemical Composition							
	C		Mn		S		P	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Bessemer	0.08	0.16	0.60	0.90	0.10	0.20	0.09	0.13
	0.08	0.16	0.60	0.90	0.20	0.30	0.09	0.13
Open Hearth	0.08	0.15	0.70	1.00	0.10	0.20	....	0.06
	0.15	0.25	0.60	0.90	0.10	0.20	....	0.045
	0.10	0.20	1.00	1.30	0.10	0.20	....	0.045
	0.10	0.20	1.00	1.30	0.20	0.30	....	0.045
	Base Steels				Silicon Under 0.08			
Open Hearth	0.10	0.20	0.30	0.60	....	0.05	....	0.045
	0.15	0.25	0.30	0.60	....	0.05	....	0.045
	0.15	0.25	0.70	1.00	....	0.05	....	0.045

Silicon = 0.03 to 0.30 Per cent

steels, besides increasing the tensile strength of the uncarburized material, improves the hardenability of the carburized metal. Fig. 8 illustrates the effect of the manganese on the hardenability of a carburized case. Fig. 9 shows the relative hardenability of carburized screw machine steels as estimated by carburized and end-quenched hardenability specimen.

The medium carbon steels are improved in machinability by the addition of sulphur. Medium-carbon bessemer steel which also contains a high phosphorus content is not used widely. The chemical composition of the typical medium carbon screw machine steels is shown in Table IV.

The medium carbon steels to which sulphur is added contain a higher manganese content like the lower carbon steels. As far as tensile strength is concerned in the un-heat treated condition, the addition of the manganese offsets the effect of sulphur, although the transverse properties are still reduced due to the presence of manganese-sulphide inclusions. The obtaining of physical strength by heat treatment is also aided by manganese additions. Fig. 10 shows average longitudinal tensile properties of a plain carbon and a sulphurized steel after heat treating by quenching in water in 0.50-in. test bar size from 1550 deg. F., and tempering in intervals of 100 deg. F. from 600 deg. F. to 1100 deg. F.

Fig. 11 shows hardenability curves obtained from 1-in. round specimens quenched in water from 1550 deg. F. The effect of the manganese content and the effect of austenitic grain size can be noted on the depth of hardness penetration.

TABLE II

Average Longitudinal Tensile Properties of the Screw Machine Steels Shown in Table I

(Cold drawn condition, ½ to 1¼ in. diameter)

Melting Practice	Average Composition				Tensile Properties			
	C	Mn	S	P	Y. P., Lb. Per Sq. In.	T. S., Lb. Per Sq. In.	Elongation, Per cent in 2 in.	R. A., Per cent
Bessemer	0.12	0.75	0.15	0.11	90,000	95,000	15.0	45.0
	0.12	0.75	0.25	0.11	89,000	94,000	14.0	44.0
Open Hearth	0.12	0.85	0.15	0.07	70,000	77,000	20.0	55.0
	0.20	0.75	0.15	0.03	75,000	82,000	19.0	54.0
	0.15	1.15	0.15	0.03	85,000	90,000	20.0	56.0
	Base Steels							
Open Hearth	0.15	0.45	0.03	0.02	70,000	80,000	20.0	62.0
	0.20	0.45	0.03	0.02	75,000	85,000	19.0	58.0
	0.20	0.85	0.03	0.02	78,000	88,000	20.0	60.0

Control of Microstructure

Controlled structure is an important element in maintaining good machining properties. When controlled structure is spoken of, carbon distribution, micro-grain size and hardness are included. These are controlled by rolling temperatures and cooling rates although the grain size is also a function of steel making. The structure to be aimed for is a coarse grain structure with a carbon distribution separating the ferrite micro-constituent into the smallest blocks. This is true of both low and medium carbon steels. Fig. 12 illustrates the effect of the finishing temperatures on the carbon distribution and micro-grain size of a 0.15 per cent carbon steel. Microstructures similar to the one produced by air cooling from 2200 deg. F. is preferred in low carbon steels. Fig. 13 shows desirable and undesirable microstructures in a 0.40 per cent carbon steel.

Cold Drawing

Cold drawing improves the machining properties of all low and medium carbon steels and is probably the greatest single factor in improving machinability. It is also preferred because its closer dimensional tolerances make for ease of handling in the screw machines. The standard draft for cold drawing is about 1/16 in. This draft improves the machining properties by making the ferrite constituent more brittle and, therefore, making for a more easily breaking chip. The effect of cold drawing on the

TABLE III

Recommendations for the Application of Screw Machine Steels

	Chemical Composition						A.S.T.M. Grain Size	Welding	Riveting	Spining	Cyaniding	Carburizing	Machining	Bolts or Shafts			Exp. of Hol. Cyl.
	C	Mn	S	P	Max. Si	Max. Cr								Tension	Shear	Torsion	
Bessemer	0.12	0.80	0.25	0.10	0.08	0.05	2	No	No	No	No	No	A	A	A	D	D
Open Hearth (sulphur and phosphorus added)	0.15	1.20	0.25	0.06	0.08	0.05	2	No	No	No	D	No	A	A	A	D	D
Bessemer	0.12	0.80	0.15	0.10	0.08	0.05	2	No	No	No	D	No	A	A	A	D	D
S.A.E. X1314	0.15	1.10	0.15	0.025	0.08	0.05	2	C	D	D	B	A	B	A	A	C	B
S.A.E. 1120	0.20	0.80	0.15	0.025	0.08	0.05	2	B	C	C	B	B	B	B	B	B	B
Open Hearth (S.A.E. X1020)	0.20	0.80	0.030	0.025	0.03	0.05	2	A	B	B	A	A	C	B	B	A	A
S.A.E. 1025	0.25	0.45	0.030	0.025	0.08	0.05	2	A	B	B	C	No	C	B	B	A	A
S.A.E. 1015	0.15	0.45	0.030	0.025	0.08	0.05	2	A	A	A	B	A	D	B	C	A	A
Fine grain, Low Cr.	0.15	0.45	0.030	0.025	0.20	0.15	7	A	A	A	A	A	D	C	C	A	A

The letters A, B, C and D in the above table represent preferential groups; A being the most suitable and D the least suitable.

physical properties is illustrated in Table V.

It will be noted in Table V that the effect of cold drawing on the physical properties is to raise the yield point increasing thereby the ratio of the yield point to the tensile strength and reducing the elongation value. These are to a certain extent measures of machinability which can be read from the tensile test.

Of late there has been a tendency to increase the amount of cold drawing by increasing the draft, or giving the steel further drafts, thereby increasing the amount of cold work on the ferrite constituent and making it even more machinable. In the first place, the increase of the draft from 1/16 in. to 1/8 in. insures a greater uniformity of the cold working effect from center to outside of the cold drawn bar. There may be a drop in hardness from the outside to the center of the bar of about 8 points Rockwell "B" after a 1/16-in. draft with a consequent drop in machining qualities. This is illustrated in Fig. 14. An increased draft will minimize this center drop.

With reference to low carbon steels, the increased draft will also increase the surface hardness about 8 points, from 1/16 in. draft to a 1/8-in. draft. This increase in hardness, which represents a decrease in the plastic flow range, brings the yield point closer to the tensile strength and decreases the elongation value. This makes, as stated before, a more brittle chip and superior machinability. In connection with increased cold working, there may be certain disadvantages such as increased tendency to warpage and reduction of toughness, as indicated by impact tests, which may require an annealing operation to remove some part of the cold work strain. Fig. 15 shows what happened to the tensile strength when a cold worked steel is strain annealed.

It will be noted that at a temperature of about 600 deg. F. there is an increase in tensile strength. This increase remains until a temperature of about 900 deg. F. is reached. After this there is a decrease in tensile strength; this decrease is due to a recrystallization of the cold worked ferrite.

For the prevention of excessive warpage and improving impact strength in bars which have been subjected to heavy draft, the annealing is done at 900 to 1000 deg. F. The exact annealing temperature will, however, depend on the amount of cold work and the analysis of the material.

This appears to be an opportune time to discuss strain aging after cold work. Steel cold worked by a standard draft is often improved in machinability by heat treatment, which consists of heating at 600 to 900 deg. F. for the purpose of introducing strain effects which increase the general brittleness of the structure. In Fig. 15, it will be noted that there is an increase in tensile strength at about 600 deg. F. This is due to age hardening; age hardening is said to be due to the presence of oxygen in the steel, or that the presence of oxygen promotes the susceptibility to the age hardening. Some state that oxygen is precipitated on the

TABLE IV

Chemical Composition of Medium Carbon Screw Machine Steels

	Chemical Composition							
	C		Mn		S		P	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
S.A.E. X1335	0.30	0.40	1.35	1.65	0.075	0.15	....	0.045
	0.30	0.40	1.35	1.65	0.20	0.30	....	0.045
S.A.E. X1340	0.35	0.45	1.35	1.65	0.075	0.15	....	0.045
Bessemer	0.30	0.40	0.50	0.90	....	0.08	....	0.11
	Base Steels				Silicon 0.08 Max.			
S.A.E. 1040	0.35	0.45	0.60	0.90	....	0.05	....	0.045
S.A.E. 1045	0.40	0.50	0.60	0.90	....	0.05	....	0.045

Silicon = 0.03 to 0.30 Per cent

TABLE V

Effect of Cold Drawing on the Physical Properties of Screw Machine Steels

	Chemical Composition					Elongation				Hardness		
	C	Mn	S	P	Condition	Y. P., Lb. Per Sq. In.	T. S., Lb. Per Sq. In.	Per cent in 2 in.	R. A., Per cent	Y. P. T. S.	R_B	Brinell
Open Hearth	0.12	0.78	0.113	0.061	Hot Rolled	38,000	60,800	39.0	54.8	0.63	67	116
					Cold Drawn	72,400	74,000	18.5	47.4	0.98	83	156
Bessemer	0.11	0.84	0.187	0.107	Hot Rolled	41,000	68,000	37.5	62.1	0.60	67	120
					Cold Drawn	91,600	94,400	14.0	45.0	0.97	88	174
Open Hearth	0.20	1.18	0.100	0.016	Hot Rolled	35,300	70,800	35.5	63.7	0.50	70	140
					Cold Drawn	72,000	80,000	19.5	60.7	0.91	82	228
Open Hearth	0.21	1.33	0.215	0.013	Hot Rolled	44,500	69,100	35.5	64.1	0.64	71	143
					Cold Drawn	71,800	80,100	17.5	51.9	0.89	82	166
Open Hearth	0.20	0.45	0.036	0.007	Hot Rolled	37,050	60,200	39.5	68.0	0.62	66	118
					Cold Drawn	77,400	84,000	16.5	62.9	0.93	83	153
Open Hearth	0.32	1.31	0.099	0.021	Hot Rolled	66,900	99,700	21.0	47.8	0.58	85	170
					Cold Drawn	93,200	97,900	15.0	36.4	0.95	89	196
Open Hearth	0.45	0.74	0.027	0.014	Annealed	40,800	79,000	30.0	50.7	0.52	79	156
					Cold Drawn	95,400	108,500	16.0	42.2	0.88	99	207

TABLE VI

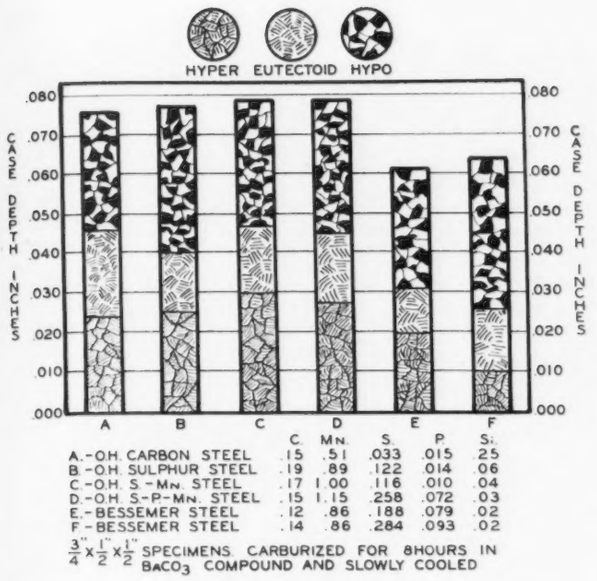
Machinability Ratings for Screw Machine Steels

Steel	Chemical Composition									Machinability Rating, Per cent
	C	Mn	S	P	Si	Ni	Cr	Mo	Va	
Bessemer	0.12	0.80	0.25	0.10	....	....	....	....	....	125
	0.12	0.80	0.15	0.10	....	....	....	....	....	100
Open Hearth										
S.A.E. 1010	0.08	0.45	0.030	0.025	....	....	....	....	....	45
S.A.E. 1015	0.15	0.45	0.030	0.025	....	....	....	....	....	50
S.A.E. 1020	0.20	0.45	0.030	0.025	....	....	....	....	....	60
S.A.E. 1025	0.25	0.45	0.030	0.025	....	....	....	....	....	65
S.A.E. X1015	0.15	0.80	0.030	0.025	....	....	....	....	....	65
S.A.E. X1020	0.20	0.80	0.030	0.025	....	....	....	....	....	68
S.A.E. 1120	0.20	0.80	0.15	0.025	....	....	....	....	....	80
S.A.E. X1314	0.15	1.10	0.15	0.025	....	....	....	....	....	92
S.A.E. 1040	0.40	0.80	0.030	0.025	....	....	....	....	....	61
S.A.E. X1335	0.35	1.45	0.15	0.025	....	....	....	....	....	75
S.A.E. 2315	0.15	0.45	0.030	0.025	0.20	3.50	....	....	....	53
S.A.E. 3120	0.20	0.45	0.030	0.025	0.20	1.25	0.60	....	....	47
S.A.E. 4620	0.20	0.50	0.030	0.025	0.20	1.80	....	0.25	....	60
S.A.E. 5120	0.20	0.50	0.030	0.025	0.20	....	0.80	....	....	55
S.A.E. 2335	0.35	0.70	0.030	0.025	0.20	3.50	....	....	....	50
S.A.E. 3135	0.35	0.70	0.030	0.025	0.20	1.25	0.60	....	....	47
S.A.E. 4135	0.35	0.75	0.030	0.025	0.20	....	1.00	0.20	....	53
S.A.E. 5140	0.40	0.75	0.030	0.025	0.20	....	1.00	....	....	45
S.A.E. 6135	0.35	0.75	0.030	0.025	0.20	....	1.00	....	0.10	45

grain boundaries as an oxygen compound, to which a formulae of FeO_2 is assigned. It might be explained by the precipitation of carbon on the grain boundaries. Others would include nitrogen and hydrogen as being factors also involved. In any case two things are known, and they are; that steels containing a high oxygen content (open or semi-killed steels) are susceptible to age hardening, and that cold working reduces the solubility of carbon in ferrite, and also the solubility of other elements present in ferrite.

The Addition of Lead

The addition of about 0.25 per cent lead to steel is a relatively recent development, although as early as 1926 lead was added to steel to control grain size. The resultant product was, however, lead oxide, in contrast to the present-day claim that the lead added remains as lead, which no doubt a greater part does. However, the fact that these steels have a little finer grain size may indicate that some lead forms an oxide. The addition of lead does increase considerably the machinability of low and medium carbon steels. Lead does not appear to decrease the transverse physical properties as does a sulphurized or phosphorized steel. This is illus-



	C.	Mn.	S.	P.	Si.
A.-O.H. CARBON STEEL	.15	.51	.033	.015	.25
B.-O.H. SULPHUR STEEL	.19	.89	.122	.014	.06
C.-O.H. S.-Mn. STEEL	.17	1.00	.116	.010	.04
D.-O.H. S.-P.-Mn. STEEL	.15	1.15	.258	.072	.03
E.-BESSEMER STEEL	.12	.86	.188	.079	.02
F.-BESSEMER STEEL	.14	.86	.284	.093	.02

$\frac{3}{4}$" x $\frac{1}{2}$" x $\frac{1}{2}$" SPECIMENS. CARBURIZED FOR 8HOURS IN $BaCO_3$ COMPOUND AND SLOWLY COOLED

FIG. 7—Carbon penetration and distribution of carburized screw machine steels.

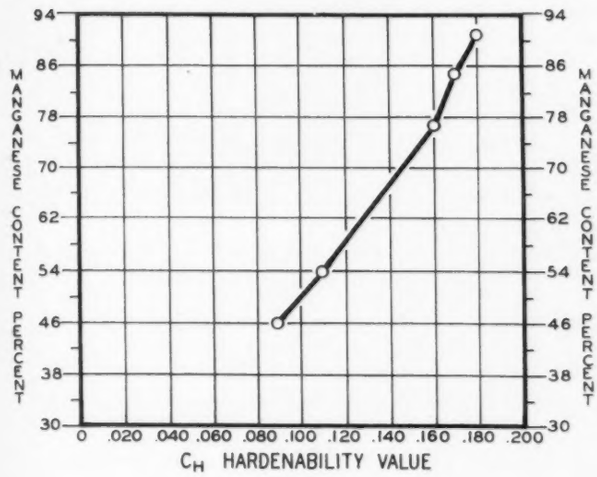
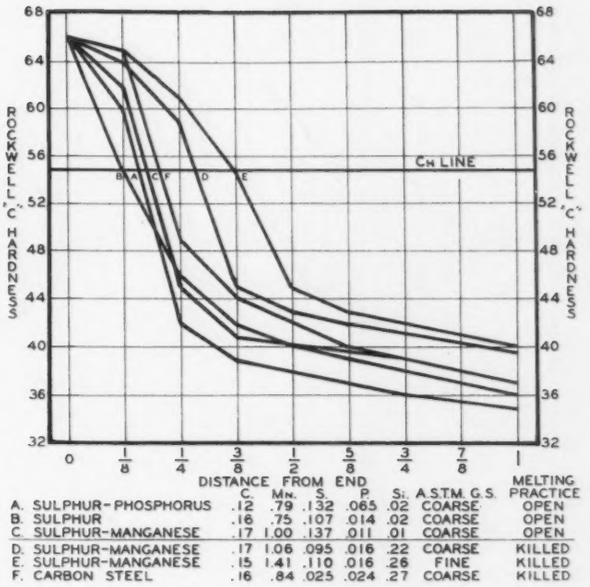
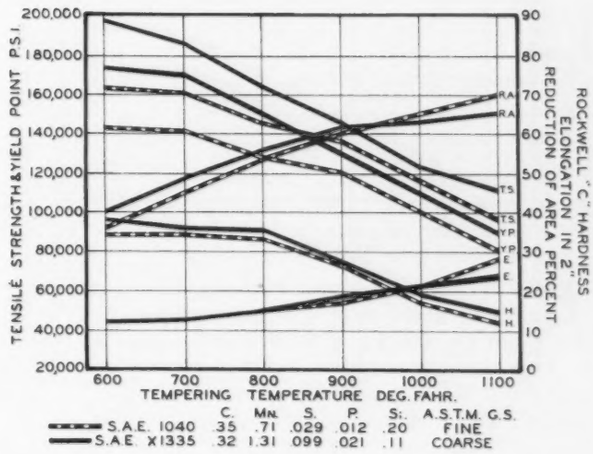


FIG. 8—Effect of manganese on the hardenability of a carburized case. Low carbon, open hearth, fine grain steel. Less than 0.050 S and 0.040 P, 0.14 to 0.19 Cr, 0.15 to 0.25 Si.



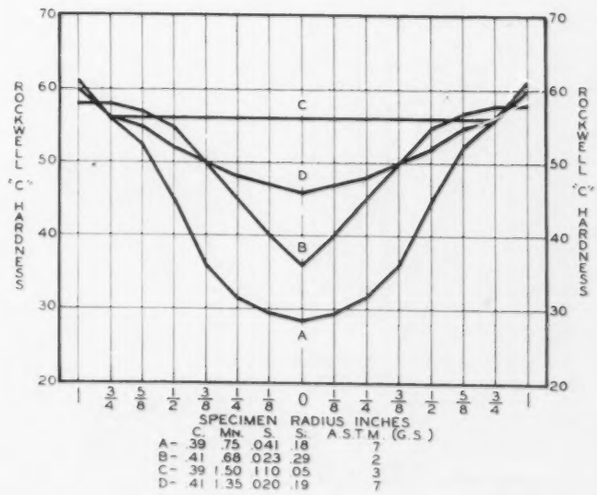
	C.	Mn.	S.	P.	Si.	A.S.T.M. G.S.	MELTING PRACTICE
A. SULPHUR-PHOSPHORUS	.12	.79	.132	.065	.02	COARSE	OPEN
B. SULPHUR	.16	.75	.107	.014	.02	COARSE	OPEN
C. SULPHUR-MANGANESE	.17	1.00	.137	.011	.01	COARSE	OPEN
D. SULPHUR-MANGANESE	.17	1.06	.095	.016	.22	COARSE	KILLED
E. SULPHUR-MANGANESE	.15	1.41	.110	.016	.26	FINE	KILLED
F. CARBON STEEL	.16	.84	.025	.024	.27	COARSE	KILLED

FIG. 9—Hardenability of carburized screw machine steels.



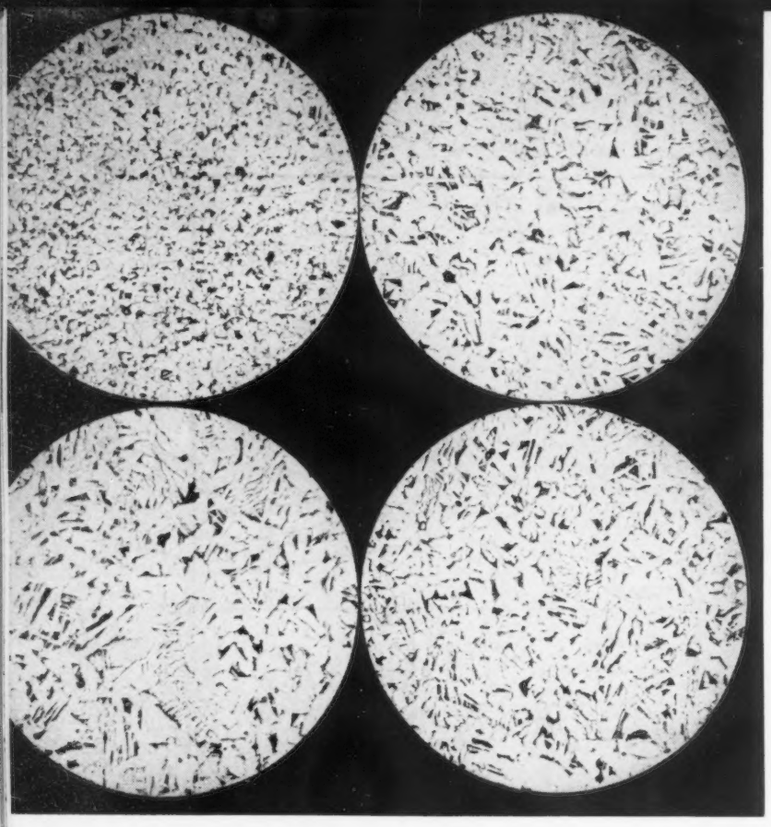
	C.	Mn.	S.	P.	Si.	A.S.T.M. G.S.
S.A.E. 1040	.35	.71	.029	.012	.20	FINE
S.A.E. X1335	.32	1.31	.099	.021	.11	COARSE

FIG. 10—Longitudinal tensile properties of a plain carbon and a sulphur steel after quenching from 1550 deg. F. and tempering as shown.



SPECIMEN	C.	Mn.	S.	Si.	A.S.T.M. (G.S.)
A-	.39	.75	.041	.18	7
B-	.41	.68	.023	.29	2
C-	.39	1.50	.110	.05	3
D-	.41	1.35	.020	.19	7

FIG. 11—Hardenability curves for medium carbon screw machine steels.



LEFT

FIG. 12 — Microstructure of screw machine steels, illustrating the effect of finishing temperature on carbon distribution and micro grain size. Nital etch, and at 100 diameters. Hardness = 126 Brinell. Air cooled from 1600 deg. (upper left), 1800 deg. (upper right), 2000 deg. (lower left), and 2200 deg. F. (lower right).

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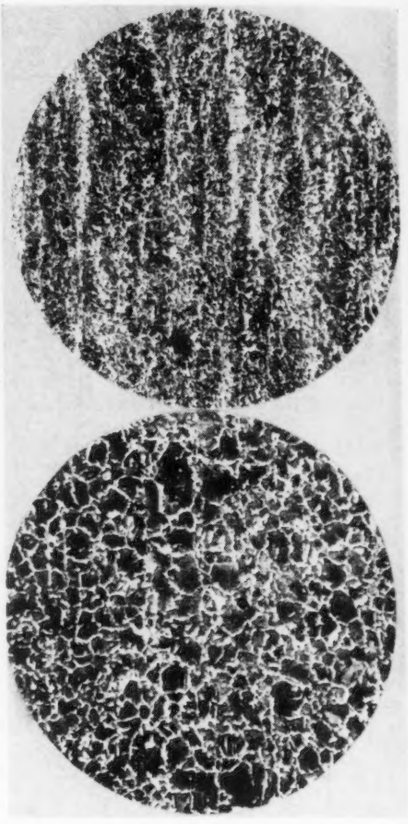

RIGHT

FIG. 13 — Microstructure of desirable and undesirable structures for medium carbon steels. Nital etch, and at 100 diameters. Undesirable (top) and desirable (bottom).

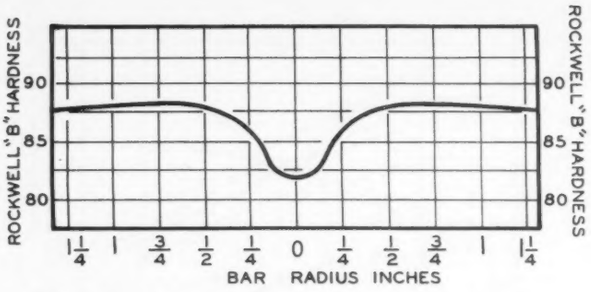

FIG. 14—Cross-sectional hardness. Cold drawn (1/16 in. draft) steel, 2 11/16 in. round; 0.19 C, 0.87 Mn, 0.160 S, 0.007 P, 0.03 Si, 0.04 Cr.

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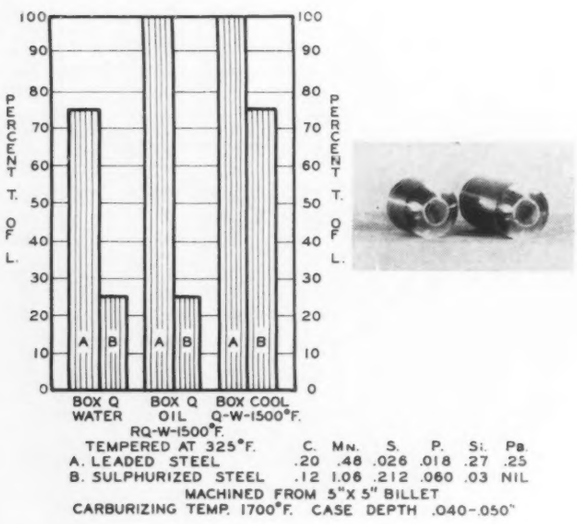
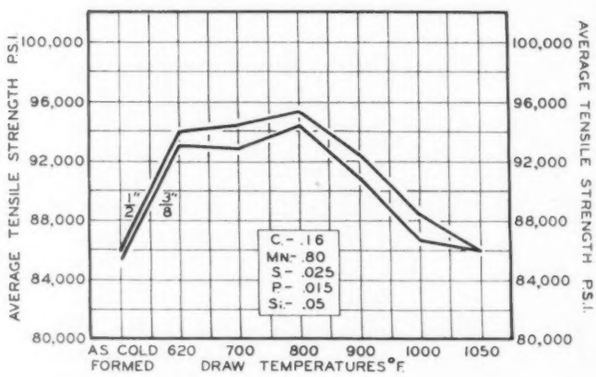
FIG. 16—Impact tests of carburized specimens. Per cent transverse of longitudinal energy absorbed.



TEMPERED AT 325°F.	C.	Mn.	S.	P.	Si	Pb.
A. LEADED STEEL	.20	.48	.026	.018	.27	.25
B. SULPHURIZED STEEL	.12	1.06	.212	.060	.03	NIL

MACHINED FROM 5"X 5" BILLET
CARBURIZING TEMP. 1700°F. CASE DEPTH .040-.050"



ABOVE

FIG. 15 — Tensile strength of 1/2 x 3/8 N.C. threaded specimens.

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trated in Fig. 16. The microstructure obtained after heat treatment is also more uniform. This is illustrated in Fig. 17.

Machinability can be, therefore, improved by addition of lead to a plain carbon steel without an appreciable decrease in physical properties, in contrast to sulphur and phosphorus additions.

Machining Tests

As to machining tests, researchers on the machinability of steels

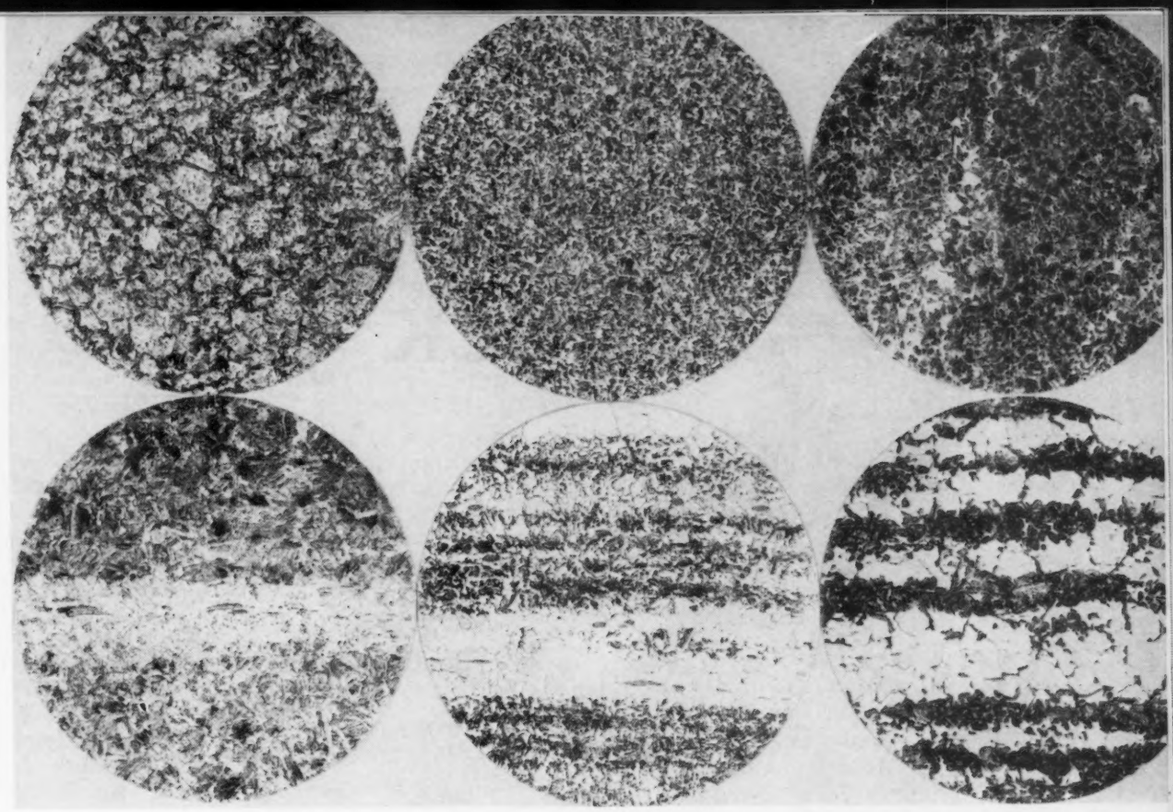

FIG. 17—Longitudinal core microstructure. Nital etch, and at 100 diameters. Leaded steel above; 0.20 C, 0.48 Mn, 0.026 S, 0.018 P, 0.27 Si, 0.25 Pb. Sulphurized steel below; 0.12 C, 1.06 Mn, 0.212 S, 0.060 P, 0.03 Si. On the left, box quenched in water; in middle, box quenched in oil and RQ-W-1500 deg. F.; on the right, box cooled, Q-W-1500 deg. F.

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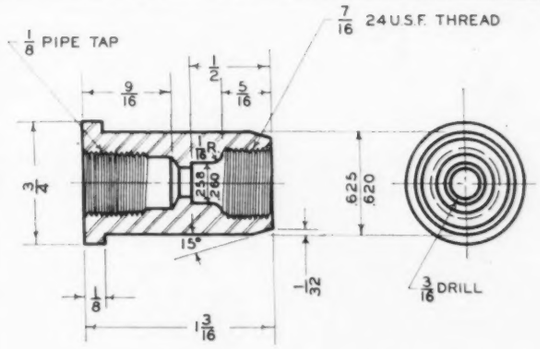
MELTING PRACTICE	CHEMICAL COMPOSITION						PRODUCTION	SURFACE FT. PER MIN.	
	C.	Mn.	S.	P.	Si.	Pb.	PER HOUR	TURNING	TAPPING
BESSEMER	.12	.86	.188	.079	.02		103	200	55
	.14	.86	.204	.093	02		120	236	59
OPEN HEARTH	15	1.15	.258	.072	.03		120	236	59
	.19	.72	.099	.024	.12		72	155	39
	.17	1.00	.116	.010	.04		90	155	39
O.H.	.15	.51	.033	.015	.25		60	125	31
BESSEMER	.12	.82	.185	.118	.03	.20	150	292	75
O.H.	.18	.88	.116	.008	.02	.17	150	292	75



have preferred to rate machinability on the basis of tool life. No doubt this is the most productive of scientific data. In general shop practice, the method is to base machinability on pieces per hour with a desired surface finish. Surface finish would include or mean dimensional accuracy; so long as the tool life is not excessively short, the shop is satisfied. In this discussion it must be borne in mind that finish may actually be dependent on tool life. In other words, the dulling of the tool may be the cause of a rough finish; however, a rough finish can be caused by the character of the material, as certain materials tend to build up or gather on the tool edge.

LEFT

FIG. 18—Machining data for low carbon screw machine steel.

Fig. 18 gives the results of tests on a part which is turned and tapped from various screw machine steels for the purpose of determining the relative machinability.

The surface finish can be scientifically recorded and classified by means of profilographs, as illustrated in Fig. 19.

The development of scientific machining is in its infancy, and it is necessary to be governed in the mean time by general shop experience. Table VI is one which has been developed by shop experience to cover all the steels generally machined in the cold drawn condition, including low and medium carbon steels, and low and medium carbon alloy steels.

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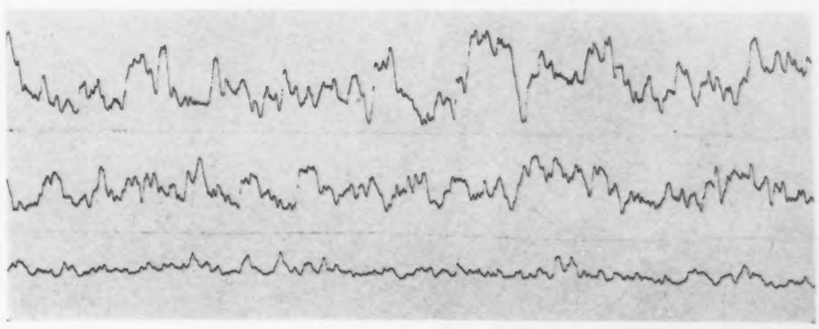
BELOW

FIG. 19—Profilographs of turned surfaces. Top to bottom; rough, medium and smooth.



How to Make

Chuck Jaws

Inexpensively and Quickly

By HERBERT CHASE

WITH the present shortage of tool makers and pressing demands for fixtures and other tools required in munition and related production, anything which facilitates such tooling and saves machine work merits careful attention. In this class are the simple fixture and related parts herein illustrated and described. Although they do not relate directly to armament and munitions items, the same principles involved are equally applicable to such items, as anyone familiar with tooling will readily see. Examples here given should suggest uncounted applications which may well help many plants, now tooling or preparing to tool for the production of war and related items, to swing more quickly into actual production.

Although the type of fixtures here described and the method of making them is especially useful for small forgings, die castings and molded plastic parts which, as made, are held within fairly close dimensional limits, it can be applied to many other types of product in which close fitting parts are required for location and/or holding purposes. It is necessary, however, to have a part from which to work or a model of the part (or of the critical portions of it) made to actual size, as the process requires the casting around the piece or the model of an alloy of bismuth, called Cerromatrix, made by Cerro de Pasco Copper Corp.

As this alloy has a melting temperature of 248 deg. F. and starts to soften at or about 212 deg. F., it can be employed only where it will not attain a temperature above 212 deg. F. in service. The low melting point, however, is an advantage in handling the metal and it can be cast in contact with wood or plastic without injuring these materials. Although hardness is only 19 Brinell, it is adequate for such applications as are here described and the metal is said not to peen out under heavy service.

A great advantage of employing a casting method is that the matrix formed makes a close fit with the

FIG. 1—Parts used in making the mold in which fixture parts are cast.

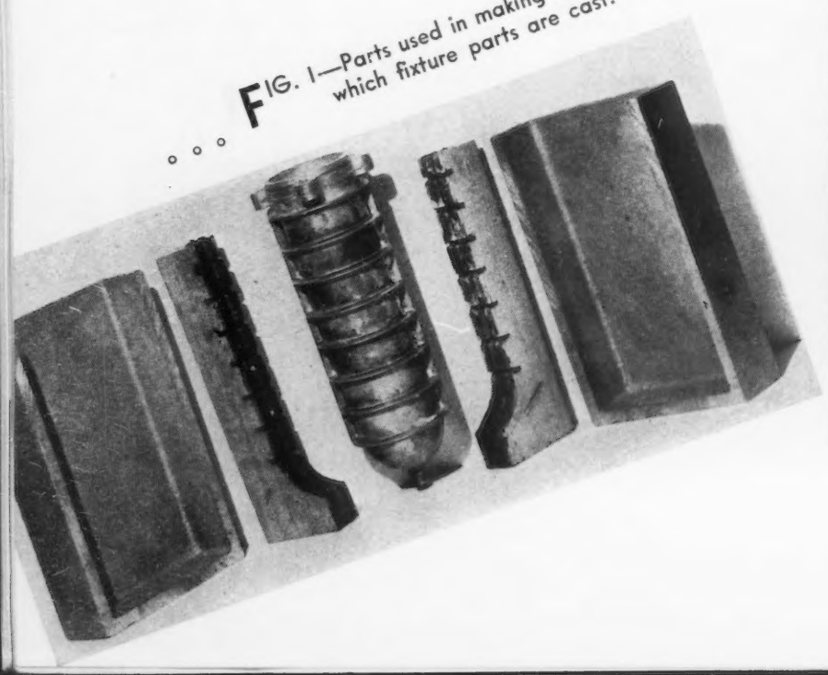
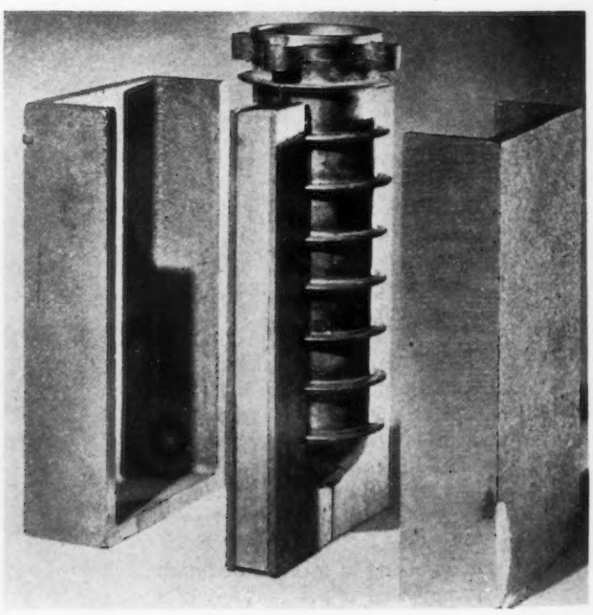


FIG. 2—Mold partly assembled, with the die casting (which is the part to be held for machining later) supported by wooden spacers.



surface of the piece or model against which the metal is cast so that very little machining is required and what is needed is very simple and demands little skill. As the material has the property of expanding upon cooling (rather than contracting, as most metals do), and as the total change in dimension is only 0.002 in. per in., the matrix makes a close fit with the piece. In some cases, it is possible to make in a few hours a jig which by the usual machine methods would require several days to produce.

Reference to the five illustrations herein will give an excellent idea as to the basic method of making one type of fixture. The piece which it is desired to grip securely (a die casting in this instance) is shown in the center of Fig. 1. To provide gripping members two matrix blocks are cast inside the two box-like brass castings which have square outer surfaces. As the matrix blocks are not to fit the entire outer profile of the piece, they are spaced apart by wooden blocks made to the required thickness by nailing two thin strips of wood to a thicker piece between. The thin strips have sawed slots spaced to fit corresponding ribs on the piece and a channel is left between the strips to be filled with babbitting clay. When the blocks are pressed against the piece, the clay makes a tight joint and the blocks support the die casting and locate it as desired, as shown in Fig. 2.

FIG. 5—Matrix blocks as they appear when holding the die casting which is to be machined. The blocks can be used as the jaws of a chuck or as the supporting parts of a fixture.

Clamps are next used to hold the box-like brass castings against the wooden blocks, as in Fig. 3. Molten metal at 300 to 350 deg. F. is well stirred and then is poured into the free space between the box portions and the piece. When the metal has solidified, the clamps are removed and the cast matrix blocks, as shown in Fig. 4, are completed. They, of course, make a close fit with the piece they are to hold and are separated, when tight against the piece, by a thickness equal to that of the wooden block used in making the mold. These openings provide plenty of space for chip clearance.

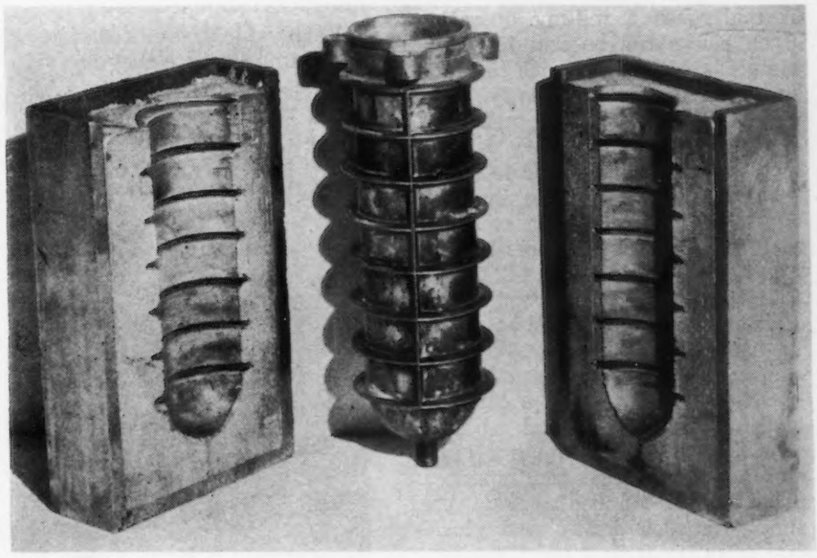


FIG. 4—Matrix blocks, right and left, as they appear after casting.

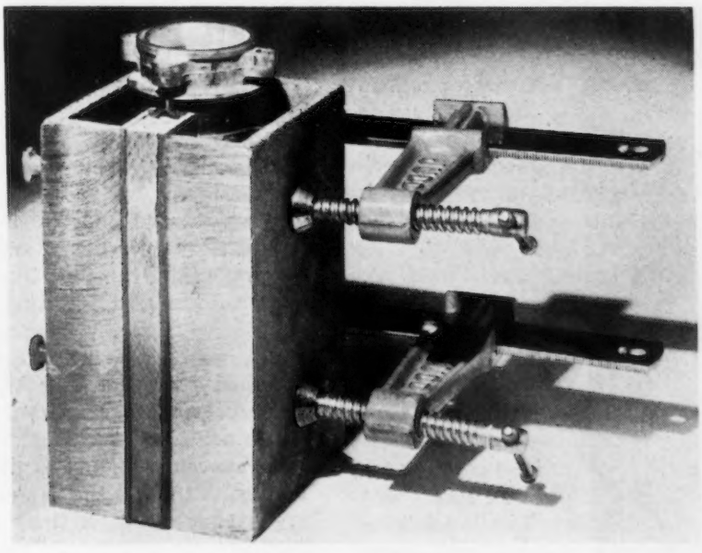


FIG. 3—Parts of mold clamped together and ready for matrix metal to be poured in.

A still simpler way of accomplishing the same result, or an equivalent one, would be to cut a length of pipe, equal to that of the brass blocks, center the die casting in this and pour the molten metal between the two. When the metal solidifies, the assembly thus made could be cut apart by sawing. This would destroy a single die casting, and would give a pair of matrix

blocks with cylindrical rather than square external surfaces. The space between blocks could be that of a single saw cut or, if preferred, two cuts would remove any desired thickness.

Blocks made by either method can be simply attached to actuating parts arranged to open and close them in any convenient way or can be used in a chuck with the blocks acting as chuck jaws. The matrix metal, being soft, would not mar the castings and would hold them, without distortion, against shifting in any direction.

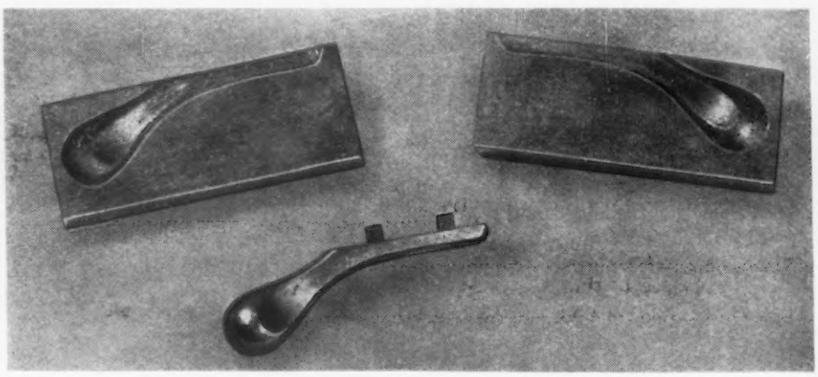
Blocks such as those in Fig. 6 are made entirely of the matrix alloy cast around a brass forging and are used to hold the latter while it undergoes a milling operation. Such blocks can be cast in a very simple box-like mold with the forging held in desired relative position while the cast is made. To separate the blocks, a piece of sheet metal cut with a contour to fit the forging could be used in the mold or the matrix could be cast in one piece and later be cut apart by sawing at the parting line. Blocks of this type have ample compressive strength for clamping, but should be backed by a holder to prevent bending. Jaws could even be cast in a holder, if it forms a complete box to retain the metal while it solidifies, and then would require no machining on external surfaces. Such a holder can also be made very simply in such a way that blocks cast from the matrix metal for several different shapes of parts can be inserted as required.

If pieces to be machined are uniform in size, matrix blocks such as those described have been shown to stand up for long use, even when employed for parts much harder than the matrix metal. Chips may embed themselves in the metal, resulting in a still harder surface, but need not, in general, affect the utility of the fixture. If very precise location of the piece is necessary, however, it is possible to insert in the matrix block, when it is being cast, or even afterward, hardened steel pins or other locating pieces which are highly resistant to wear. If these are put at critical points, it should be possible to locate as accurately as with jigs made entirely of steel, but with less time spent in machining.

Parts which may be distorted by machining because they are thin in section, or brittle parts, such as those molded from rather brittle plastics (which are easily broken if not given proper support over adequate areas) can be handled readily in fixtures in which the bearing or clamping portions or both are cast to fit the piece closely. In such cases, the matrix metal is cast against the piece which does the clamping or supporting, and thus is sure to make a goot fit. It is well, however, to provide a stiff backing for the matrix metal, especially if considerable pressure is to be applied. Another type of jig uses matrix metal for the clamping portion which holds a molded plastic ear-phone part to a steel jig while the molded piece is being drilled. In this case, the central portion of the clamping part is cast, but it is backed and strengthened by a steel bar which provides the hinge and contacts with the clamping screw.

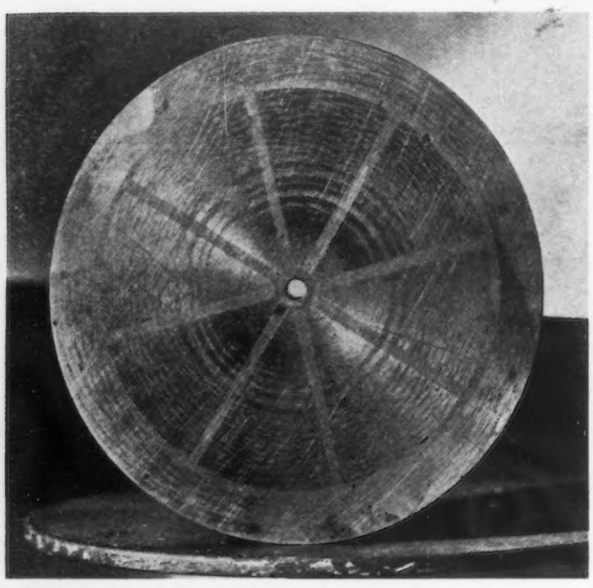
Another type of holding device made advantageously by the use of the same matrix metal above mentioned is the magnetic chuck as in Fig. 7. In this case, the metal is cast around the magnetic parts and insures a tight joint with them without peening, because the metal expands on cooling. As the bismuth alloy is diamagnetic, it also serves well to position the magnetic parts and does not affect their hardness. as the melting temperature is too low. In this, as in other cases, however, use should be confined to applications in which temperature are maintained below the boiling point of water, a condition readily fulfilled when (as in most magnetic chuck work) the work and chuck are flooded with coolant. Alnico and other permanent magnet materials which are too hard to be machined for conventional fastening are readily cast to the shape needed and are held securely in the chuck by casting Cerromatrix around them.

Chucks consisting of a cylindrical



ABOVE

FIG. 6 — Blocks of matrix metal for holding the brass forging (shown below them) while a milling operation is performed on the latter.



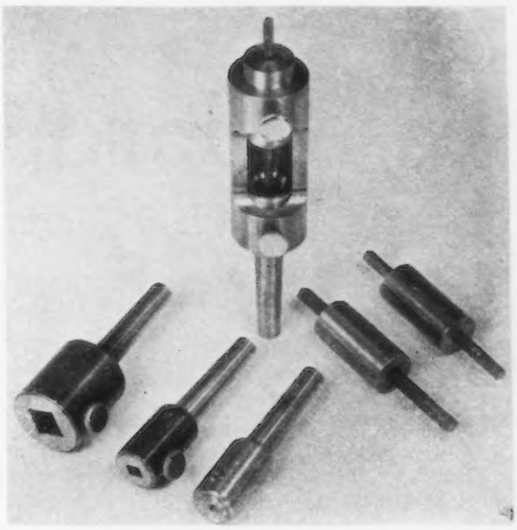
LEFT

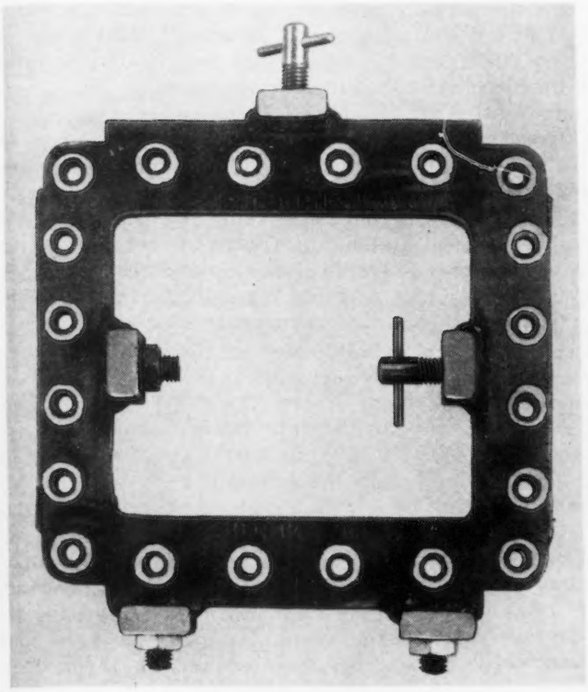
FIG. 7 — Magnetic chuck made by casting matrix metal around and between the "spokes" and "rim" of the wheel-like magnetic portion.

cup that has a tapered shank are readily adapted for holding square, flat, hex, fluted or other pieces of non-circular contour by the use of matrix metal. It is necessary only to provide a fixture, such as that shown in Fig. 8, to hold the chuck and the piece in desired relative position and then to fill the cup with the molten metal. When the metal expands on cooling, the hole might be expected to enlarge, but, as the walls of the cup prevent radial expansion, the hole cannot enlarge and the only expansion is that parallel to the axis of the chuck. Chucks made this way frequently have clamping screws and are not designed for rotation but for holding the piece in fixed position. However, chucks for rotation could be made by the same means. A large chuck recently made is for use on a rotating spindle and is threaded to fit the spindle instead of having a tapered shank. It is designed to hold a square part which fits the recess formed by matrix metal cast around such a piece.

RIGHT

FIG. 8 — Simple fixture used for holding chucks while matrix metal is poured into the cylindrical recess and around a rod which forms a hole of the required sectional shape.





LEFT

FIG. 9—Drill jig in which the bushings are held in larger holes by matrix metal which is poured into the annular space around the bushings.

Although matrix metal is especially well suited for forming matrices to fit various parts, it is also readily employed to effect an assembly of parts forming a jib or fixture or even the parts of a die. In such cases (as in the magnetic chucks, already referred to) one or several parts made in some other way are locked in the desired position relative to themselves and/or to some other member. Suppose, for example, it is desired to make a drill jig, especially one in which the holes are spaced somewhat irregularly. A convenient and inexpensive way of making such a jig is to provide a ring or chase and to set this on a plate along with drill bushings already machined and hardened. Once these bushings are set and fastened temporarily in correct relative position, the matrix metal is cast to fill the space remaining inside the ring. When the metal solidifies, the bushings will be supported as required and held securely by the matrix metal. The outer ring prevents the matrix metal from expanding (except axially), hence center distances will remain as desired and originally set.

Another way of accomplishing a similar result is to cast a plate or frame, as in Fig. 9, with holes cored or later drilled for bushings. The latter are then set and held in the holes (which are made with suitable clearance) after which the annulus around each hole is filled with molten metal. When the latter cools, the bushings are held where required. Similar results could be secured, of course, by using a wrought steel plate and drilling clearance holes for bushings without special precautions to locate them on precise centers, and afterward casting the bushing in place as before. Bushings should not be much away from the center of the hole, however, as then there may be some tendency for them to shift slightly through the differential expansion as between the thinner and thicker wall of cast metal around the bushings.

It is not contended, of course, that the uses of matrix metal in the manner indicated, or in similar applications which the foregoing may suggest, will result necessarily in the best possible fixtures or jigs which can be built. The process has its limitations, but it also has its good points, and not the least of these is the saving in machine work and the rapidity and convenience with which tooling can be made.

Case Hardening Small Parts

LIGHT case hardening of a wide variety of small steel parts used in Buick automobiles for 1941 is being carried out in a new type of continuous gas furnace boasting a number of constructional and operating innovations.

The following tabulation shows parts processed in the furnace, the steel from which they are made and details of the heat treatment:

Clutch release yokes: S.A.E. 1010 with 1112 pins; 0.007 in. min. case.

Selector shafts: S.A.E. 1112; 0.007 in. min. case.

Shifter rails: S.A.E. X1315; 0.007 in. min. case.

Shifter control levers: S.A.E. 1010; file hard case.

Pushrod lower ends: S.A.E. 1112; 0.007 in. min. case.

Pushrod upper ends: S.A.E. 1112; 0.007 in. min. case.

Valve adjusting ball studs: S.A.E. 1112; 0.007 in. min. case.

Brake pedal pins: S.A.E. 1115; file hard case.

Propeller shaft couplings: S.A.E. X1345; harden-no case.

Flywheel ring gears: S.A.E. 1045; Rockwell C37-40 on teeth.

Oil pump shafts: S.A.E. X1015; 0.010 in. min. case.

Knuckle spindle nuts: S.A.E. 1112; file hard case.

Clutch release lever pins: S.A.E. 1112; file hard case.

Steering knuckle support nuts: S.A.E. 1112; file hard case.

Oil pump idler gear pins—first carburized with 0.020 to 0.030 case: S.A.E. X1015; file hard case.

Oil pressure valves: S.A.E. X1335; Rockwell C40 min. case.

Parts are pushed through the furnace in trays, two rows of which ride side by side on alloy steel rails resting on structural cross members. Each row includes 28 trays, 12 x 18 in. in size. They are moved by a pusher mechanism at the charging end which exerts pressure on the two trays being charged and thus moves the entire row of trays and discharges a pair onto the quenching fixture at the discharge end. No conveyor chains or dogs are required inside the furnace.

The furnace case is sealed tight. It is fired through 20 return bend U-tubes heated through low-pressure gas burners. Seven burners fire on each side over the charge; three fire below on one side and two below on the opposite side, these at the front or charging end of the furnace; one burner fires below the charge near the discharge end. Temperatures are controlled in three zones of the furnace, operating temperature being in the range 1500 to 1525 deg. F.

Radiant tubes are 5 in. in diameter and exhaust into short vertical stacks outside the furnace on either side.

Trays are of special design, made either to hold a loose charge of small parts, or a racked charge of parts, the latter supported in an alloy grid placed over the top of the tray. Bottoms are open mesh, and sides are perforated to permit ready passage of the carburizing gas. The trays are kept lined up inside the furnace by means of lips on the two outside rails on which they travel. Center rail has a double web and is flat on top. Each tray carries an average load of about 40 lb. Furnace capacity is 1500 lb. per hr., allowing 1½ hr. in the furnace at 1500 deg.

Hardening gas is a mixture of prepared gas, city gas, propane and ammonia, in the following typical proportions, the figures being hourly consumption: Prepared gas = 700 cu. ft.; city gas = 200 cu. ft.; propane = 14 cu. ft.; ammonia = 180 cu. ft.

Gas is prepared in a patented type of generator in which city gas and air in proportions of 1.7 parts of air to 1 of gas are partially cracked inside an alloy bottle heated externally. After cracking the gas, the mixture is passed through a dehydrator and then through charcoal which builds up the CO_2:CO ratio. Gas is admitted to the furnace through three sealed inlets at the side, just above the level of the tops of the trays. Circulation is provided by three power-driven fans set in circular openings in the refractory bottom of the furnace, about 18 in. below the rails. Motors for the fans are outside the furnace and driveshafts are sealed with bushings to prevent gas leaks. A Selas "flo-scope" is attached to the generator to indicate flow rates of the various gases.

Ammonia tanks are manifolded, six in a bank, with three in use at one time. It was found necessary to use three tanks because with only one supplying gas, it would tend to freeze up because of too rapid flow. Gas passes through a pressure regulator, with flow gaged from a manometer.

Pressure of the carburizing gas is regulated at from 0.15 to 0.30 in. of water, the pressure recording outlet pipe being located about at the center of the furnace, half way up the sidewall.

A vestibule is provided at the charging end to prevent loss of gas inside the furnace. An outer door is opened and two trays are placed in position on the rails in the vestibule (see Fig. 1). The door is closed and an inner door opened, following which the pusher mechanism starts its cycle and moves the line of trays ahead one position. A screw type pusher is used, controlled through electric timeclock. Pushing cycle may be varied from 3 to 7 min., depending upon the type of case desired on the parts. Where specifications call for file hard case, the cycle usually is set at 3 min.; where a heavier case, such as .010 in., is required, the cycle is lengthened to 7 min. Thus, the only variable is the pushing cycle, temperature and carburizing gas mixture being held fairly constant.

Double doors also are provided at the discharge end. As two trays emerge into the discharge vestibule, a set of arms pulls them out onto an elevator which lowers them into the oil quench tank (see Fig. 2). The cycle of this elevator also is controlled by electric timeclock, on the same basis as the pusher. In the oil the trays rest on an inclined

—in a new type of continuous gas furnace

RIGHT

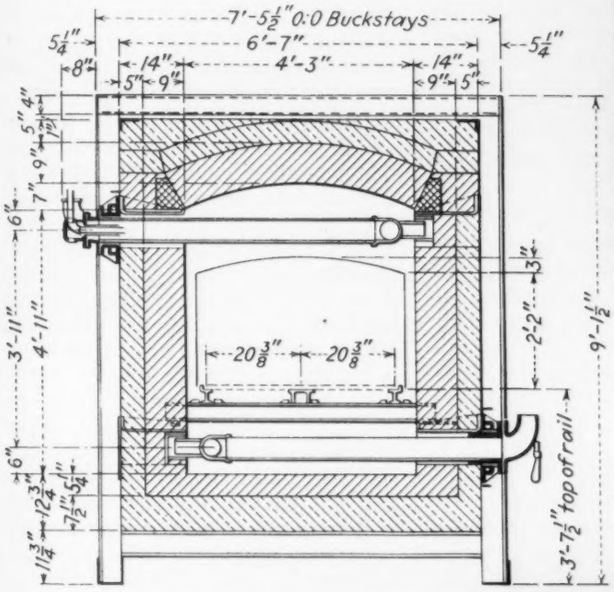
FIG. 2 — Discharge end of the furnace, showing the quench tank and trays coming out of the oil.

o o o

chain conveyor which moves them up and out of the oil to permit an operator to unload. As parts are unloaded from the trays, the latter are placed on an inclined roller conveyor which returns them to the charging end of the furnace for the next load. An unusual feature of the quench tank is that it is not set in the customary pit in the floor, but instead is above floor level, easily accessible for maintenance and inspection.

BELOW

FIG. 3—Cross-sectional dimensions of the carburizing furnace. The case and vestibule are welded gas tight.

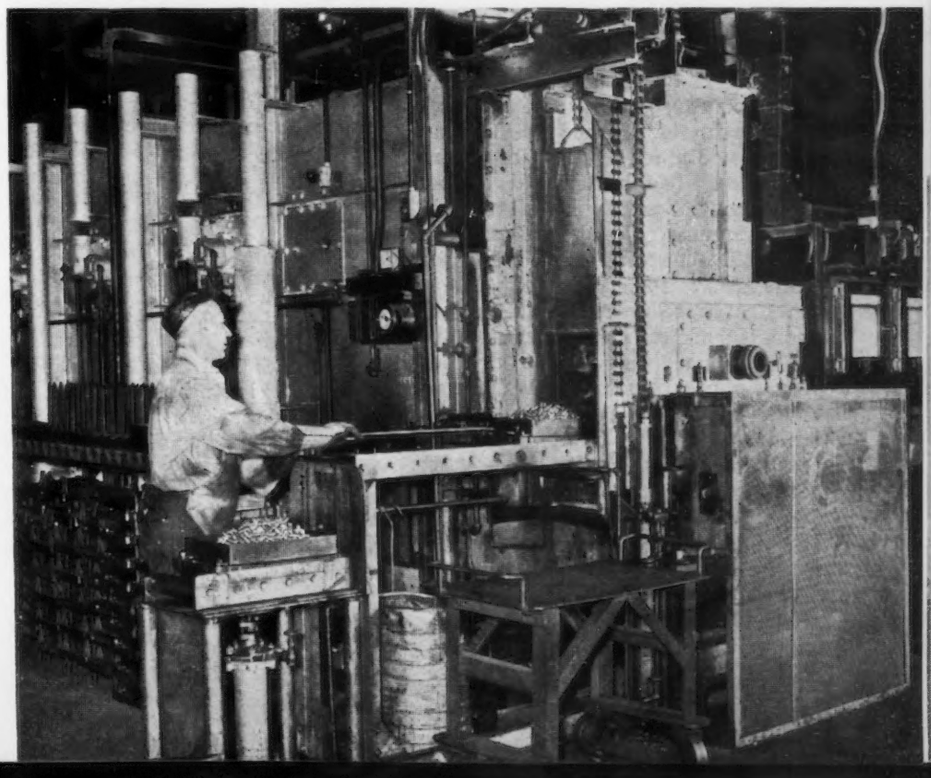


BELOW

FIG. 1—Charging end of furnace from the generator side, showing two trays entering the vestibule.

It is always possible to vary operation of the furnace for special purpose. For example, propeller shaft couplings require no case, merely a clean hardening, so the ammonia is shut off when these parts are being processed and they are given a straight heating at 1525 deg. and an oil quench.

This is possible because the rails on which the trays ride inside the furnace are 43½ in. above floor level (see Fig. 3). Other dimensions of the furnace are: Overall height, 9 ft. 1½ in.; inside width, 4 ft. 3 in.; inside length, 27 ft. 6 in.; available height inside, 2 ft. 2 in.; width to outside of buckstays is 7 ft. 5½ in.; sidewall thickness, 14 in.; distance between centers of top and bottom radiant tubes, 4 ft. 11 in. Design of furnace and generator was developed by Holcroft & Co., Detroit.



Polishing With Liquid

THE term "liquid cold glue" is defined as meaning any glue that does not require cooking before use. This includes the cements which are mainly silicate of soda products built up by the addition of other materials to give to the final product those properties which are necessary in the polishing room.

Silicate of soda has been used for many years on certain classes of work with good results, but as a general adhesive the absence of certain qualities prohibits its use on a polishing wheel. First of these is flexibility. When the moisture is driven off, pure silicate of soda becomes too hard for use on a flexible polishing wheel. Second, silicate of soda does not dry fast enough. Speed of drying is essential when setting up wheels; therefore, this basic lack discourages the use of pure silicate of soda on polishing wheels.

However, now the manufacturers of liquid cold glue using silicate of soda as a base vary the final result to obtain flexibility and fast drying; thus, the main objections of straight silicate of soda are eliminated, but its good adhesive property is retained.

Most cold glues are ready to use as received. No preparation is required. The cooking of glue has on occasion caused difficulty, and perfection in the finished product can only be obtained by a uniform temperature. The bacteria in animal glue multiplies rapidly, at certain temperatures, giving to glue an odor that is not pleasant. Also, the final results sometimes vary due to the fact that in some plants the proportions of glue and water used are not standardized. There are, of course, cold glues on the market that require the addition of a thinner in order to use them for certain sizes of grain, but, generally, cold glues can be bought that are ready to use.

Silicate of soda and animal glue do not mix chemically without disastrous results to the adhesive qualities of both; therefore, a clean wheel must always be used. There have been, in the past, cases where wheels glued together with animal glue have split when headed with cold glue. However, in the past three years, the writer has not encountered such a condition. It is now well established that wheels put together with cold glue have long life and are not subject to splitting when used where polishing creates a lot of heat. Heat does not destroy the adhesive qualities of cold glue, therefore the wheels cannot split.

Sizing

It is necessary to start with a clean wheel when using cold glue. All the old glue and grease must be raked out. For most work, cold glues with a Baume of 35 deg. may be used for sizing; but for hard wheels, this viscosity must be lowered in order to obtain penetration. Water may be used as a thinner. Five to 10 per cent is generally used with good results, although the use of as much as 25 per cent is not harmful.

The thinner the cold glue used for sizing, the harder the wheel becomes; therefore, the amount of water used should vary with the flexibility wanted. The thinner the sizing coat, the more penetration and the harder the head. This, of course, applies only to muslin, canvas and felt wheels and to canvas belts. Leather wheels need special care.

Direction of Travel

It might be well to mention here the first rule of good polishing—run the wheel in the same direction at all times. All wheels should have some marking on them so that the operator knows in which direction the wheel must run. If the sizing is brushed on the wheel so that the nap of the cloth is laid down, the wheel set up with grain in the same manner and then run in the right direction, that wheel will produce many times more work than a wheel that is run against the nap.

It is well known that if the hand is rubbed against the nap of a felt hat or piece of velvet, it feels rougher than when the hand is run with the nap. This also holds true of a polishing wheel. If the wheel runs against the nap, the wheel will not last as long, due to a leverage created under the grain that tears the grain loose from the adhesive.

This practice also applies to the finish produced on a piece of work. If the work travels in the same direction as the wheel is running, i. e., down, the finish is smoother than if the work travels against the direction of rotation, or up. When a piece of work is brought up against the direction of rotation, the groups of grain are set on edge and sharp grains dig into the work. When the work travels down, with the direction of rotation, these groups of grain are laid down with the nap and a better finish is obtained. This is a first principle of polishing but is often overlooked by a careless operator. It is true that a faster cut is created when polishing against the nap, so it is a question of which is the more important, speed of polishing or better finish and longer life of the wheel.

Grain

Not much can be said about setting up the grain on a wheel. The amount of cold glue applied on the wheel depends on the work and the viscosity of the material used as well as the size of grain. Best practice, however, is to put on a well brushed down coat since a thin coat, well applied, will last longer than a heavy uneven coat. It is important that the wheels are not warmer than room temperature. If they are too warm, the cold glue will set quickly and not enough grain will be picked up. Here again, cold glues have the advantage over

Cold Glue

By J. F. SIEFEN

—As yet the use of liquid cold glue in the polishing room is still in its infancy, but changes it has made in production technique are quite significant. This article gives all the up-to-date data on silicate of soda base cold glues, and lists properties in such a way as to be of distinct help to the average finishing shop.

hot glue. In cold weather, wheels and grain must be warm when using hot glue so that the glue does not become chilled. Incidentally, warm grain can be used with cold glue to hasten the "set" and in this way reduce the drying time of the wheel.

Drying

When using more than one head of grain the drying time between heads is important. Subsequent heads should be applied as soon as possible after the preceding heads so that the two knit together as one. If the second head is applied when the first is just dry to the touch, this second head moistens the first enough to knit them together. If too long a period passes before brushing on the second coat of cold glue, the chances are that there will be a moist layer nearest the wheel that will be sealed in and consequently take longer to dry. Therefore, either put on the second head as soon as possible or wait until the first head is thoroughly dry.

Cold glue set-up wheels can be dried in temperatures up to 200 deg. F. with excellent results. A word of caution, however, about the use of high heat. If the wheels are placed in an oven of 180 deg. or 200 deg. immediately after setting up, the heat will change the chemical structure of the adhesive and destroy the value of it. For that reason, allow the wheels to remain at room temperature for a few minutes before placing in the oven so that they will "set." The higher the degree of heat up to 200 deg. used, for drying these wheels after an original set, the more production will be obtained from them. The moisture content of the adhesive can be brought down to 3 to 5 per cent and excellent results will be obtained. If too much moisture is removed, the wheel will be too brittle. If too little is removed, the wheel will be soft and not produce enough work.

The drying time and temperature at which the wheels are dried vary with the type of cold glue used. Those that dry sufficiently at room temperatures overnight are apt to produce a hard head. This quality is inherent in that grade of cold glue. Those that dry slowly or that require a higher degree of heat for drying are more flexible and are desirable for that reason.

Humidity

Humidity plays an important part in the drying and storing of wheels set up with the cold glue. When humidity is high, wheels take longer to dry. Even when dried thoroughly, they will pick up moisture from the air. Therefore, it is necessary, when storing wheels for a number of days before using them, that they be thoroughly dried. Then, storage in a warm dry room will keep them in good condition.

One of the latest methods used to protect wheels from picking up moisture after they are dried is to brush or spray on a headcoat of a waterproof material. This will prevent the wheels from picking up moisture and they can be stored indefinitely without harm, even when the relative humidity is 90 to 95 per cent.

When wheels are dried in an oven, no matter how much heat is used, provide an outlet for the moisture. This is particularly important when drying wheels set-up with animal glue in the same oven that is used for drying cold glue set-up wheels. Animal glue contains more moisture than cold glue. The wheels set-up with cold glue have a tendency to pick up this moisture if a sufficient outlet is not provided.

Cluster of Grain

There is another principle or rule of good polishing—the smaller the cluster of grain when the wheel is broken in, the better the finish. The larger the cluster of grain, the rougher the finish.

For proof of this, just look at the wheels in the shop. The roughing wheels or wheels set-up with grain in sizes up to No. 80 are broken up into large clusters or groups of grain. These wheels cut fast and produce a rough finish, regardless of the grain size. Of course, the coarser the grain the faster and rougher the wheels cut. But the high viscosity of the glue used, either animal or cold glue, determines the thickness of the composite head of grain and glue. The results are large clusters of grain and a faster and rougher cut. There is a limit, however, to the size of this cluster that can economically be used. Too large a cluster produces too rough a fin-

ish, and, therefore, it should again be noted that the smaller the cluster for a given grain size the smoother the finish, and the smaller amount of work necessary in subsequent operations to remove these rough marks. For example, a small cluster of grain on a No. 60 roughing wheel will produce about the same finish as a large cluster on a No. 80 wheel. But because the wheel lasts longer on the No. 60 grain with a small cluster, it is advisable always to strive for this effect.

Fracture of Grain

While grain size is important for speed of polishing, the manner of cutting plays an equally important part. This manner is accomplished in several different ways. Another rule states: a gradual fracture of grain is necessary for good polishing. If grains do not fracture and whole grains are torn out of the head, the wheel is not efficient. If grain fractures too fast that wheel, also, is not efficient.

The companies manufacturing grain have spent considerable time and money on research to produce varying hardnesses of grain; today, any hardness of grain can be obtained, and grains can be used that fit the work. Too hard an adhesive will not only result in a large cluster of grain but it also will hold the individual grain so that it cannot fracture. Because cold glues are not softened by heat, a grain that will fracture easily is better to use than a hard grain. This is true of all normal polishing jobs. The only time a hard grain is recommended is for a polishing job on edge work, where the tendency is to tear out the grain before it has a chance to fracture. Work of this kind is hard on any polishing wheel and if the way can be paved with a grinding operation, it pays to do so. Soft grains should be used for smooth work on sheet metal such as automobile stampings and refrigerator cabinets.

Glazing is due to the use of a too-hard grain and a too-hard adhesive on a smooth sheet metal job. A wheel that wears down gradually and uniformly will produce more work and better work faster. If grains fracture at the proper rate, the wheel will always cut well and will not glaze.

It should again be mentioned that cold glues are not affected by the heat of polishing. Also, cold glues hold the grain so that it is always cutting at its best, and the same light pressure can always be used. This not only gives more production from the wheel but also gives faster production because the rate of cut is always the same. Connect this fact with the fact that the right hardness of grain will give maximum production and it readily can be seen how it is possible to turn out large quantities of work on a cold glue wheel.

Cutting Down Operations

The rate of cut being the same for the life of the wheel, cold glue has another important attribute. Consider the number of pieces produced by a polishing wheel from the time it is started until it is worn out. For instance, say that the wheel was a No. 80 roughing wheel and it produced 500 pieces of work. On using cold glue, it is true that the wheel will cut sharper than a hot glue wheel at first and consequently will require more "breaking in." This can be done with either a smooth piece of steel or the regular work; setting aside the first few pieces and repolishing them after the wheel has been broken in.

The fact that heat does not affect cold glue allows the grain to be presented to the work so that it cuts at the same rate of speed from the time it is broken in until the wheel is worn out. The last piece will have almost the same polishing marks as the first one; and because the adhesive does not soften under heat, the same pressure can be used at all times.

The polishing marks from the No. 80 wheel are the same on every piece. Consequently, the jump in numbers can be greater because the next wheel, if set up in cold glue, will also cut the same for the life of the wheel. From No. 80, it is possible to jump to No. 180 without sacrificing production time. The No. 180 wheel will completely remove all No. 80 marks because the No. 80 marks are all the same and the No. 180 wheels cuts the same at all times.

This jump of 100 numbers is being done in a great many plants. In fact, a jump of 120 numbers is being used successfully. As has been pointed out, this jump of numbers is possible only because the grain is sharp at all times. Cold glue also permits a finer grain to be used for any given job.

Wheel Density

Wheel densities also play an important part in good polishing. Roughing wheels are generally soft because coarser grains can be used with a large cluster of grain, and the softer the wheel, the larger the cluster. There are limits on this, however, and the same rule about grain cluster applies at this point when a wheel is chosen for a particular polishing operation. The smaller the cluster of grain wanted, the harder the wheel must be and the more flexible the adhesive. Except on real rough polishing, medium hard or hard wheels and a flexible adhesive are desirable.

In most instances, when muslin wheels are used, a $\frac{3}{8}$-in. sewed

Operation and Grain Size for Different Metals

	Soft Wheel, Hard Grain, Hard Adhesive	Medium Wheel, Medium Grain, Flexible Adhesive	Hard Wheel, Soft Grain, Very Flexible Adhesive
Aluminum:			
Cast	30 – 46	80 – 120	150 – 200
Sheet			150 – 200
Brass:			
Cast		70 – 90	150 – 200
Sheet			150 – 200
Cast iron:			
Rough	36 – 60	80 – 120	150 – 200
Smooth		70 – 100	140 – 180
Die castings (zinc or aluminum)			
Parting lines		80 – 120	
All over			180 – 220
Steel forgings:			
Rough	24 – 46	70 – 90	180 – 220
Smooth		70 – 90	180 – 200
Cold rolled stampings:			
For paint		46 – 80	
For plate		60 – 90	150 – 200
Stainless		90 – 120	180 – 240

wheel is used for grain sizes up to No. 80. For finer sizes ¼ in. sewed wheels are used. These, of course, may be bought in various densities. All sewed wheels are not the same density. They vary in construction and must be bought with this in mind. There are also quite a few proprietary makes of wheels on the market that offer qualities suitable for particular types of work. These have proved themselves over a period of years, but the above rule of density applies to these wheels as well as to the regular run of wheels.

Break-Up

Before a wheel is first placed on the machine, it is desirable to break up the head with a flat or round piece of steel. This is done to hasten the breaking-in time, because all wheels must be broken in before they produce the desired results. Start any place on the wheel and by hitting it at an angle to its face, proceed around the wheel striking about ¾ in. to 1 in. apart.

After going around once in this manner, continue around again, holding the break-up bar at an angle of 90 deg. to the first break-up angle. This will break-up the head in the best manner.

Place the wheel on the machine, running it in the proper direction, i. e., so the nap is laid down. Sometimes it is necessary to hold a bar of steel against the wheel when it is first run to prepare it for the job. Obviously, the less preparation necessary at this point, the longer the wheel will last because the use of the bar only removes an unnecessary amount of grain. A flexible head, or one which breaks in easily, is best.

THIRTIETH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

Using the Wheel

When using a polishing wheel do not try to obtain too much work from it. Always leave a thin head of grain on the wheel if at all possible. This thin head of grain acts as a foundation for subsequent set-ups. This foundation will assure the user of always obtaining the proper amount of work from the wheel. If a polisher wears a wheel down to the cloth, less work is obtained on the next set-up, as there is no foundation to work on.

The choice of wheels, grain and adhesive plays a very important part in the condition of a wheel before resetting. But the most important item is the adhesive. If it is too hard, the grain will not wear down sufficiently and will result in a build-up of grain on the wheel. Sometimes this head of grain becomes so thick that large pieces are thrown off during the polishing operation. Besides being dangerous, it is bad polishing practice. Wheels should be worn down uniformly each time they are used. A harder wheel, a softer grain or a softer and more flexible adhesive will assure the obtaining of this effect.

Resetting

Finally, after the wheel has produced enough work, trim the high spots with an abrasive stone and it is ready for resetting. This, of course, applies to a wheel that is used on work that requires only part of the wheel. If the work is done on the entire face of the wheel, no dressing should be necessary.

On oil wheels, after trimming by stone if necessary, absorb the grease by pumice or brick and then reset. When using cold glue it is vital that a head of grain be left on the wheel since cold glue will adhere to a head of grain but will not adhere to greasy cloth.

As was stated in the opening paragraph, the application of liquid cold glue for polishing is still in its infancy. New methods for using it are found quite often. These given are a résumé of those which have been proved successfully during the last few years. Mass production has made polishing an exact science instead of a hit and miss evil. Good results can be obtained if the proper materials are used in the proper manner.

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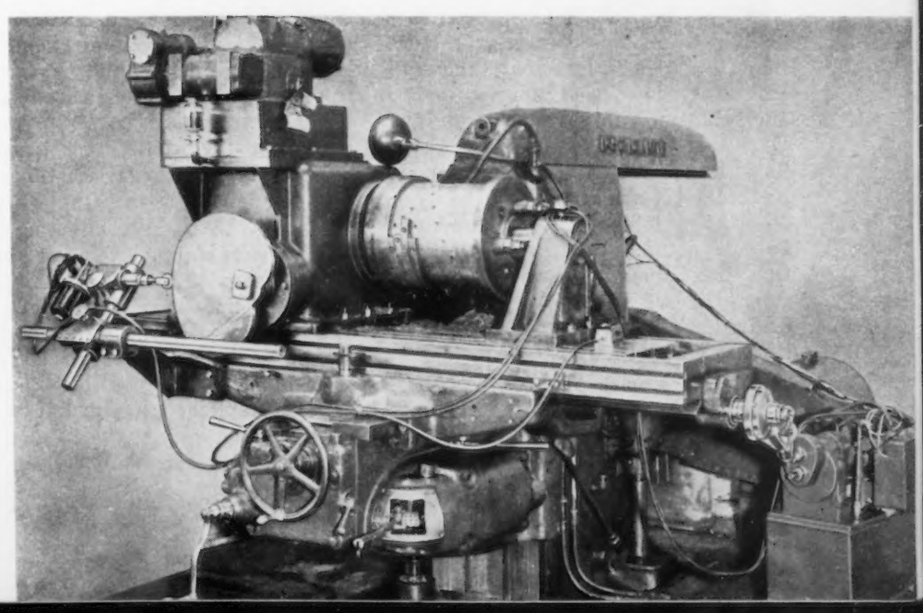


PRODUCTION milling of cams for automatic screw machines is now being done with savings of upwards of 12 hr. per set of drum, stock feed and cross feed cams with a Detroit Universal Duplicator Co. control, seen at the right attached to the transverse feed screw of the miller. Semi-automatic operation, reduction of hand finishing time, release of the machine operator's helper for other work are other features of the process which was originated by Greenlee Brothers & Co., and is in use at this machine tool builder's Rockford, Ill., plant. For the drum cam shown, cutting of the cam path from the solid in two cuts requires but 90 min. as compared with a total of 9 hr. for operator and helper with previous manually controlled methods.

Measuring Thickness of Magnetic Sheets

A NEW magnetic gage which for the first time measures the thickness of sheet steel when only one side is accessible has been invented by W. E. Abbott and B. M. Smith of the General Electric engineering laboratory at Schenectady. The gage is accurate to 0.001 in.

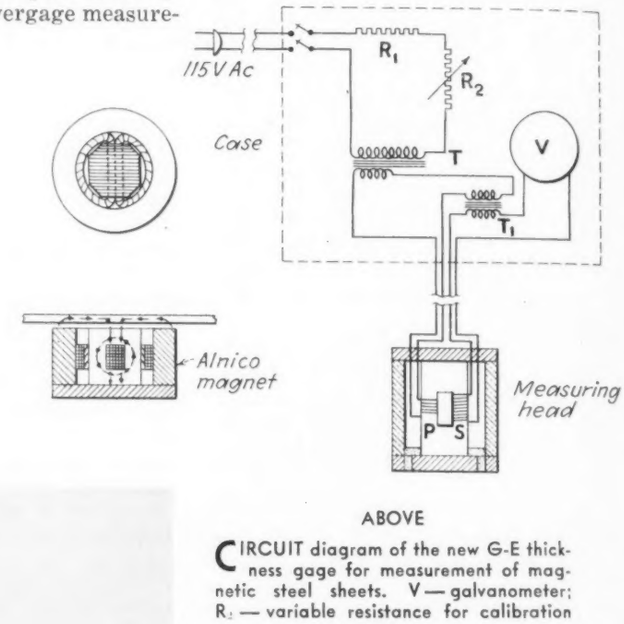
It consists of a 7-lb. portable indicating unit, which is connected to an electric outlet, and a small cylindrical head containing an alnico magnet. When the gage head is placed against the material to be measured, the permanent magnetic field of the head saturates the material. How much magnetic flux passes through the gage head magnetic circuit depends on the thickness of the material. This thickness is indicated by the instrument reading which is a measure of the increased reluctance of the magnetic circuit.

Thickness of any magnetic sheet or plate material may be measured by the gage as long as the material is not backed by other magnetic material, the designers explain. The gage is especially valuable for checking the center and other points on wide sheets of steel where the use of calipers is inconvenient or impossible.

Chief advantages are stated to be the speedy determination of the uniformity of the material, the possibility of making measurements from one side of the sheet only. The more precise appraisal of the thickness and uniformity of sheets will result in considerable savings, since sheet steel is purchased by weight and since overgage measurements at the center can easily be detected. Also the greater uniformity of material will lower manufacturing costs.

The initial instrument made in the laboratory has two scales, one with a range of 20 to 45 mils (0.020 to 0.045 in.) for low carbon steels, either hot or cold rolled, and another of 10 to 25 mils (0.010 to 0.025 in.) for electrical sheet steels of medium silicon content.

Gages can be made to measure up to 250 mils (¼ in.) with the same relative accuracy and even thicker if portability is sacrificed. Larger thicknesses would require larger gage heads to supply the magnetic saturation.



ABOVE

CIRCUIT diagram of the new G-E thickness gage for measurement of magnetic steel sheets. V — galvanometer; R_2 — variable resistance for calibration purposes.

LEFT

G-E magnetic thickness gage for measurement of material of which one side only is accessible.

Flux for More Efficient Tinning

A NEW fast acting liquid flux of the zinc chloride type for use in hot tinning, in the manufacture of terne plate and for soldering, has been developed by the Hanson-Van Winkle-Munning Co., Matawan, N. J. This new Fas-Tin-Flux is free from uncombined hydrochloric acid. A gallon weighs 15 lb. and it comes in a standard 55-gal. drum. Wherever possible this flux should be used at full strength, but it may be diluted if desired. The preferred cycle for tinning is as follows:

Remove grease from the work, rinse, pickle, cold rinse, dip in Fas-Tin-Flux and then into the tin pot. As far as possible a flux fusion made from the material should be kept on the tin pot and the entering work should pass through it. Close control of these features assures smoother coats, less pin holes or craters and longer resistance to the salt spray test. One of the users of this material has improved, it is claimed, the salt spray figures from 48 hours to about 125 generally and even 240 hours in some cases. Rinsing after hydrochloric acid pickling must be done as completely as possible and is best accomplished by scrubbing in running water in order to remove most of the ferrous chloride. The rinsed work should be put in the Fas-Tin-Flux at once to prevent rusting. Ferrous salt deposits, recognizable by their green color, are certain to lead to poor coatings.

The new flux may be poured on molten tin without danger of explosion. It will form a foamy blanket and tend to harden unless it is constantly supplied with water by a drip. Zinc chloride is most effective as a flux when water is supplied with it to form hydrochloric acid gas in the fusion.

New Production Techniques Probed

—Open hearth operators report on surface defects, Crespi bottom, Chrom-X, new pouring technique, desulphurization, steel quality, etc.

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MEETING for the twenty-fourth time, the annual conference of the Open Hearth Steel and Blast Furnace and Raw Materials Committees of the A.I.M.E. held last week at Chicago was one of the most successful recorded. Over 600 technicians registered for the three-day session, and quite obviously all of them were primarily concerned with new ideas which would permit squeezing the maximum of steel from existing equipment with the greatest possible efficiency. All new ideas were given a particularly receptive hearing, and no doubt the next year will witness more widespread adaptation of experimental practices than has hitherto been the case.

In his opening address at the Palmer House Wednesday morning, Chairman L. F. Reinartz of Armco spoke a few words on the activities of the McKune Award Committee, and introduced the 1941 recipient—Henry J. Forsyth, of Republic Steel Corp., Buffalo, whose winning paper was "Role of the Ingot Mold in Control of Semi-Finished Surface on Killed Steels."

Control of Surface Defects

Mr. Forsyth pointed out that semi-finished surface quality has become one of the most important economic considerations in the production of open hearth killed steels. This has resulted from the large output of bars for forging, cold drawing, and similar purposes which make good surface an essential requirement of bar mill products. The present demand for various armament materials has served to emphasize further the importance of surface quality.

The surface of bars is largely determined by the surface of blooms or billets from which they are rolled. To assure good bar surface, semi-finished steel must be cleaned from defects by chipping or scarfing. If these defects cannot be controlled, the amount of chipping or scarfing required to remove them may result in prohibitive cleaning costs, slow movement of steel, and rejection of finished product.

Mold coating is a basic yet often neglected operation affecting the surface of killed steels. Because it is often claimed that mold coatings produce benefit only by reducing scabbiness, many producers are satisfied with any coating which will completely cover the inner mold wall surface. Actually, proper tar or pitch coatings will effect such reduction of seams and tears or breaks on billet surface so that they are indispensable to the producer of killed steels.

With several grades of killed steel above 0.25 C ladle analysis, it was found that mold coating produced distinct reduction in large ingot surface defects but showed greatest advantage by drastically reducing the number of seams on billet surface. A typical example was SAE 1045 fine-grained steel. In most instances areas of solid chipping indicate densely grouped small seams or tears. Results from the entire heat showed an average of 396 ft. of chipping per ingot from uncoated molds as compared to only 216 ft. with tarred molds. Thus, coated molds reduced billet surface defects by 45 per cent. Further experiments substantiated by production performances, produced an average saving of 1.1 chipping hours per ton by the use of coated molds on various fine and coarse-grained killed steel over 0.25 C in analysis.

With steels below 0.25 C, mold coatings effected considerable reduction of seaminess, but were outstanding in reducing the number and depth of large breaks or tears on ingot and billet surface. The advantage of tar coated molds has been obvious. Savings ranging from 0.8 to 3.5 chipping hours per ton were obtained by using coated molds for both fine and coarse-grained heats of SAE 3115, 1020, 1120 and similar steels. Reduction of scabbiness was apparent on many heats but was by no means the principal source of advantage for mold coatings.

Mr. Forsyth indicated that pitch or tar has been found to be the most effective mold coating for

killed steels. Tar, to be used effectively, must be applied as a thin practically volatile-free coating which completely covers the inner mold wall. It should be pre-heated and applied with a spray, with amounts delivered to each mold so regulated that it settles on the mold wall in a finely dispersed cloud. It is essential that mold temperature be controlled when coatings are applied. If mold temperature is too low there results a thick, highly volatile coating which will produce small pits or blow holes—these appear on the billet surface as small seams. If the temperature is too high the tar burns or explodes, yielding a granular coating which usually does not completely cover the mold walls. Mold temperatures depend upon the type of tar used, but good results are usually obtained with mold temperatures between 250 and 450 deg. F.

Pitch, because of its lower volatility, produces a slightly better surface than tar. However, because of its higher melting point, mold temperatures must be closely controlled when pitch is used. If used in excess, it has the same detrimental effects as tar, but on the whole will produce generally better results if it is properly used.

It is often claimed that tar or pitch coatings produce such undesirable surface defects as mold action, corner cracks and flute cracks, particularly on low carbon and coarse-grained grades, according to Mr. Forsyth. In his experiments he was never able to find a case where such defects did not occur with equal severity on all product of heats equally divided between coated and uncoated molds.

Other facts concerning mold wall condition were briefly reviewed by Mr. Forsyth. It was found that if molds are not coated, good molds may produce worse surface than old molds on many grades of steel. Thus to derive full benefit from good molds, it is essential that they be properly coated. It was also found that corner cracking is common to the first ten pours of mold service, and grades sensitive to this defect should never be poured into molds less than five pours in service.

During low operations when long soaking times are possible, the blooming mill can do much to determine surface quality. However, during high production fast moving steel may cause drastic reduction of soaking times. The harmful effects on surface can be greatly offset by close control of mold wall conditions and coating practice. By considering mold practice, it is possible to devote special care in soaking to heats poured into old or poorly coated molds. On the other hand, good mold practice will on the average produce good billet surface with only normal or even subnormal soaks. This statement is made particularly to apply to various fine-grained alloy and carbon steels of over 0.25 C analysis produced under reasonable furnace and pouring conditions, according to Mr. Forsyth.

The Crespi Bottom

Following Mr. Forsyth's paper, the Committee directed its attention to refractories. An excellent review of design changes and utilization of refractories in the open hearth was presented by Louis A. Smith, refractories engineer of Jones & Laughlin Steel Corp. Mr. Smith was of the opinion that the pressure for greater production will force many open hearth men to try things which otherwise they might just continue to discuss or debate for the next few years.

Of particular interest in this refractories session, however, was the extensive discussion of the Crespi bottom, presented by Phil M. Reinartz, of Armco International.

Two years ago in Europe the acute shortage of magnesite led to the investigation of the value of pure dolomite refractory linings. At the urgent request of certain steel companies, Mr. Reinartz was commissioned to visit Italy for this purpose.

In Europe the situation was this: France and Great Britain together—in Caledonia, Rhodesia and British India, Turkey and Greece—had and still do have a near world monopoly on chromite. The only other chromite deposit of any consequence, barring small ones in western U.S.A., occurs in Yugoslavia. The Allatini Mines there, British owned, are in the part taken in the first German drive into Jugoslavia. It happens that these deposits are just across the Carpathian Mountains from Radenthein, where the best and most extensive Austrian magnesite is found. Thus Germany has a virtual monopoly on magnesite in Europe.

For some time before the Austrian Anschluss the use of Radex brick in Germany was forbidden. Immediately after the annexation of Austria, however, magnesite from there again was plentiful and the Radex brick again were used in Germany. However, even today the Rheinish-Westphalian industrial part of Germany has a shortage of magnesite refractories because the Hermann N. Goering and other new works in the east have first call on all refractories.

Radex (chrome-magnesite) bricks were being introduced rather rapidly in the German steel works before the ban on their import was enforced. Therefore, there were not so many furnaces installed as might have been the case had the imports been unrestricted. Again, as soon as the ban was lifted through the annexation of Austria, these bricks were all going into new works which were just beginning to make steel when war broke out.

According to Mr. Reinartz, in one particular plant a front wall was put in on a 65-ton tilting furnace, but the additional life did not begin to pay for the extra cost of the brick. Dripping from the silica roof corroded the front wall badly and when the furnace was tilted some of the brick fell out. However, it could be seen that there was good promise of long life in those parts of the front wall which neither dropped out nor had silica drippings. At the next repair, the front and back wall, and the roof together with the port ends, were put in with Radex. These held up fine, but the points at which silica brick came in contact reacted with the latter and gave bad results.

In talking with the manager of this particular steel plant, Mr. Reinartz was told that it was useless to use these expensive chrome-magnesite Radex brick unless the plant is prepared to go all the way. This was done in the next general furnace repair—roof, front and back wall, ports, blocks and downtakes, clear down into the slag pockets were constructed in Radex. The bottom and banks of this tilting furnace were put in with magnesite brick, grain magnesite and slag as traditionally done.

This furnace was inspected after 1020 heats and quite obviously it looked good for at least another 500 heats. This is the more remarkable because this furnace taps 65 tons every 4 hr. or less. It happens to be one of two finishing furnaces fed from a slagged and fired (ac-

tive) mixer so that banks, walls and roof are held constantly at comparatively high temperatures. On the other hand, also, the lining is exposed to less temperature fluctuation from heat to heat. The product of these furnaces runs the whole gamut of carbon because they make in them everything from razor blade steel to ingot iron. Perhaps 50 per cent of the output is mild steel for sheet and bars running 0.07 to 0.12 carbon.

Certainly, it would seem that the subject of basic construction for basic reaction furnaces deserves more than academic interest.

Needless to say, any leakage of water on basic brick must be more meticulously avoided even than with silica brick work. In the first place, the German and all other European furnaces use considerably less water cooling than is the practice in this country, and on the Radex furnaces seen by Mr. Reinartz, only the doors and frames and the front and back skew-back channel, of cast section, were water cooled.

Returning to the question of dolomite bottoms, Mr. Reinartz stated that when it was first heard that an Italian by the name of Crespi has invented and patented a new type of dolomite refractory lining, most typical steel plant men were skeptical. In fact, when this method was first offered, Mr. Reinartz himself developed at some length, seven good reasons why dolomite was no good for open hearth or electric furnace bottoms.

Perhaps it was natural to expect that this was a poor war-time substitute, but the very reverse turned out to be true.

Today, even though Italy could get magnesite from her German Axis partner, they are continuing and increasing the use of Crespi dolomite bottoms there. Since the German occupation of industrial Europe, reports have come through that the bottoms which had been constructed just before the collapse of France and which had stood idle from June of last year to January of this year, have again been put into service with no damage to or replacement of the bottoms. This answers the question of slaking of Crespi bottoms during temporary shut-down periods. Also in England trial installations have been made and have proved satisfactory.

Here in America, Mr. Reinartz feels that the Crespi dolomite bottoms can make an even bigger contribution by decreasing the installation cost, saving many hours and even days in getting new or relined furnaces into production, saving maintenance cost, and improving quality due to less bottom material giving inclusions in the steel.

Mr. Crespi tried out this new type bottom both in electric and open hearth furnaces at the Terni plant. After four years' successful practice, they now use it in all five of their 60-ton open hearths and all 12 of their 25-ton electric arc furnaces.

After this first success, Mr. Crespi patented his method in Italy and all other steel producing countries, the first patent having been issued last year (No. 2,206,277, July 2, 1940) also in the United States. Other patents are now pending in this country, covering all other cheaply available magnesia bearing carbonates, oxides, etc.

Precisely, the Crespi invention consists in having found the way to use dolomite or other cheap magnesia bearing refractories, without the use of agglomerates, tar or fluxing agents.

In open hearth, the bottoms, banks, burner blocks, necks—that is, all parts where magnesite has been used and tried, in the electric furnace the entire shell, lining becomes one dense, highly refractory, monolithic mass.

Incidentally, the "K" factor of insulating value is almost three times as good for this pure, burnt dolomite, as the corresponding value for sintered magnesite. This is important to the open hearth, but even more important to electric arc and other furnaces, such as soaking pit bottoms, copper and brass and aluminum and other heat treating furnace hearths.

For routine slag line maintenance, the Crespi bottom and repair system saves just about one-half the making up time and material. The same is true in Europe on open hearth furnaces. In this country, where dolomite slinging machines are generally used, some difficulty may be experienced in slinging this fine, largely powdery material across a big furnace. Attention is being directed to working out something on this either by alterations to the dolomite slinging machine itself or by including about 50 per cent coarse particles with the fines for the routine slag line repair. In Europe this proportion has proved to be good.

Tests have been carried out to show that the American magnesite is amenable to preparation suitable for the Crespi bottoms. Chemically, a comparison of the analyses will show that there is little difference here:

	Eastern U.S.A. Dolomite, Per Cent	Native Italian Dolomite, Per Cent	Native Belgian Dolomite, Per Cent
MgO	38.25	38.12	37.50
CaO	57.50	54.94	56.50
SiO_2	1.25	2.31	0.50
Fe_2O_3)			
Al_2O_3)	1.00	3.25	1.50
R_2O_3)			
Loss on Ingn.	2.00 (As rec'd Middletown)	0.84	2.40

Quality forging, cutlery and ordnance carbon steels, all the way down to low carbon automobile sheet steels, tin plate steel and ingot iron have been successfully melted for 4½ years on these bottoms, under producer gas, fuel oil and arc melting. The steel is cleaner with respect to inclusions, the time of bottom repair reduced, the cost and time of bottom making itself is radically less, according to Mr. Reinartz.

Following the data on the Crespi bottom by Mr. Reinartz, it was pointed out by Gilbert Soler, of Timken, that in 1932 his company put in such dolomite bottoms, using a binder, and tapping in with an air hammer. He ventured the opinion that although the Crespi patent specifies the use of no binder, that there might actually be some binding taking place due to impurities in the dolomite.

3-In. Brick Preferred

Next, some discussion developed on 3-in. vs. 2½-in. brick in the construction of open hearths. It was reported that Republic has used 3-in. brick for some time, that Inland has used this size brick for about 5 years, and Wheeling has employed such practice for about 8 years. The advantages of the 3-in. brick were pointed out to be as follows:

(1) Faster time in laying.

(2) Greater salvage, there being considerable less breakage.

(3) Fewer joints; therefore less cement is required.

(4) Lower inventory; for, 3-in. brick can be used both in the blast furnace and open hearth.

The next subject examined was

the progress in design of stopper rods, nozzles and sleeve brick. R. H. Stone, of Vesuvius Crucible Co., had considerable data to offer on this problem.

Stoppers and Nozzles

Mr. Stone pointed out that the outstanding fact today regarding steel pouring refractories is the increasing number of the ingot shops reporting pouring practices of 95 per cent and over. A half dozen or so shops are consistently getting 98 + per cent. When it is realized that these figures represent the ratio of ingots poured with a perfect shut-off—no leaks or dribbles —to the total number of ingots cast, obviously pouring practice has reached a high degree of perfection in these shops.

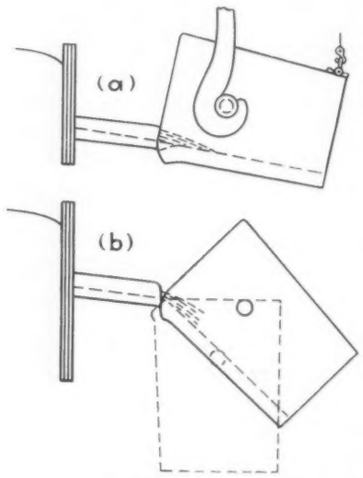
If any plant is getting lower figures it may be due to the types of steel poured, either excessively hot or of the kinds that are supposed to be particularly tough on refractories. With these exceptions, there are a number of causes of faulty practice, most of which have been brought out at these general conferences, as well as at the local section meetings.

When pouring troubles do occur, according to Mr. Stone, they are usually due simply to failure to carry out carefully the standard practices that most shops have established. In one place the rigging has not been overhauled and tightened up frequently enough; in another, the stopper maker may have become careless in assembling the stoppers or in setting the stopper in the ladle so that it is in line with the nozzle.

There are, however, cases where a change in design or standards would unquestionably result in a reduction of faulty pouring. Briefly some of these points may be brought out by the following questions: (1) are the parts of the stopper of sufficient weight or size to carry the load; this includes the steel rod, the sleeve brick, the stopper head and pin; (2) are the stopper head and nozzle of the best design, regarded both individually and in conjunction with each other. This question cannot be completely and fully decided without including the design of the nozzle-well which has a very great effect on the behavior of the stopper head in its function of controlling the stream.

Without going into too much detail, Mr. Stone stated that every open hearth operator has a pretty good idea of the proper size of stopper head required for his particular size of heat and the same goes for the sleeve bricks. Perhaps the importance of a generous sized stopper pin or bolt is not quite so generally realized.

Likewise, there are few, if any, operators who do not fully understand what it takes to make a good nozzle, the correct contour of the stopper seat and the proper relationship of length to diameter of flow hole. But occasionally a nozzle-well is seen which is made up very deep and very narrow so that the stopper head even at its maximum elevation is still in a very high velocity stream of steel. If the rigging is in as good shape as it should be, there need be no fear of the stopper getting out of place with a shallow nozzle-well.



• • Method of tapping which minimizes oxidation loses.

There are very few shops left using a clay stopper head, according to Mr. Stone. Up to three or four years ago some shops clung to clay heads because they were cheap and a shut-off could usually be made. Nowadays, however, the elimination of inclusions is so important that no possible source that can be eliminated should be tolerated.

When a shop considering changing from clay to graphite stopper makes service tests the steel pourer usually will get a few dribbles which may turn into a running nozzle. The remedy as soon as a dribble starts is to bring the stopper head down on the nozzle with a steady, squeezing pressure so that the head will form a new seat in the soft surface of the nozzle. A steel pourer, however, who has been using clay heads doesn't realize how much pressure he can put on the graphite heads: if he did it with a clay head, it would freeze to the nozzle.

Taking up the question of types of graphite stopper heads there are, according to Mr. Stone, three types in use, pin, screw and bayonet. There are examples of both foundries and ingot shops using one of all these three types. So quite obviously they can all be used successfully. It is estimated, however, that 95 per cent of all the stoppers used are of the pin type.

If a shop is really getting good results from a certain stopper and nozzle set-up, it would be folly to advocate a change. If, however, trouble is recurrent, particularly dribbles and leakers, the design of both the stopper and nozzle should be checked. The best practice in this respect appears to be obtained with the more pointed head and the convex surface nozzle with a rather flat seat. It has been pointed out by other observers that with the more pointed head the pressure required for a shoot-off is less than with the blunt head. Furthermore, the pointed head has less surface exposed to the molten steel.

If the trouble is with loss of heads, very likely a larger diameter stopper with a bigger diameter pin should be selected and a more refractory plug mix used. With the bayonet and screw type stoppers the problem of plug mix composition is entirely eliminated, according to Mr. Stone.

A wide selection of stoppers and nozzles is available from which, with an understanding of the problems involved and the desired objective, a proper choice may be made.

Conserving Manganese

The Wednesday afternoon session of the open hearth group was concerned with strategic materials. Considerable discussion developed on conservation of manganese in steel production, as for instance use of spiegel or silicomanganese instead of ferromanganese, use of spiegel or silicon pig iron in bath before tapping to conserve manganese, ferromanganese additions to ladle versus additions to metal bath, etc.

However, one very interesting

technique was contained in a German report described by L. F. Reinartz. The original research was set forth by P. Bardenheuer and G. Henke in report 366 of Steel Works Committee of UDE.

Part of this report dealt with investigations into the causes responsible for manganese losses from oxidation in the ladle and led to the belief that they are largely due to considerable volumes of air being entrapped in injector manner by the stream of metal. Inside the ladle, this air then comes in intimate contact with the steel by violent whirling motion. These air bubbles carried deeply into the bath exert the same oxidizing effect as in the converter processes; the losses resulting from oxidation being the greater, the greater the height from which the stream of metal is caused to fall.

These processes are best illustrated by the following simple experiment. If water is permitted to run from the tap into a glass, it may be observed that even a thin stream carries with it appreciable quantities of air. If the level of the liquid rises above the discharge opening of the line or if the glass is held against the opening at such a slope that the stream of water can "slide" into it, no air is carried along.

On the basis of these observations, the tapping operation was subsequently carried out as follows: With the aid of the auxiliary hoisting hook of the ladle crane, the ladle is brought to the spout of the runner or directly below it in an almost horizontal position (see accompanying illustration) so that the stream of metal is able to slide into the ladle over the gently sloped wall. As the level of the liquid in the ladle rises, the ladle is gradually turned to a more upright position so that the level of the liquid in the ladle is at all times as high as possible with respect to the tapping manner. In this manner, the entrapment of air and intermingling of air and metal is avoided and carbon and manganese losses due to oxidation can be minimized.

Another technical advantage of this method of tapping resides in the fact that stopper and stopper sleeves are heated up very slowly by the steel entering the ladle thanks to the latter's almost horizontal position. Similarly, if the tapping stream is sluggish and the metal mushy, the oblique position of the ladle will prevent a skull from forming around the stopper.

The effect of this new way of tapping upon the oxidation losses of carbon and manganese is evident from the figures given in the following table. It may be seen that the manganese losses could be reduced to a fraction of the former losses and that the carbon loss, also, was much smaller. It will, therefore, be much easier to maintain a certain composition in the finished product.

The loss of manganese as suffered by the ferromanganese added in the ladle, of course, is somewhat higher because the alloy undergoes oxidation as early as at the surface. The heats which received an addition of carbon and ferromanganese in the ladle, show slight losses. Thus, it proved an advantage to add the carbon in the ladle prior to tapping so that the steel entering the ladle first will show a considerable carbon pick-up; thus, the carbon takes care of binding most of the atmospheric oxygen. For this reason, the austenitic manganese steel heats did not suffer a loss of manganese.

Carbon and Manganese Losses with New Method of Tapping

1— Furnace Pouring Bay	2— Composition, Per Cent C	Mn	Ladle Additions	Manganese Loss, Per Cent
1	0.13	0.40	17.6 lb. aluminum	
2	0.09	0.39		2.5
1	0.14	0.53	17.6 lb. aluminum	
2	0.10	0.49		7.5
1	0.11	0.34	22 lb. aluminum	
2	0.10	0.32		6
1	0.09	0.38	17.6 lb. aluminum	
2	0.08	0.35		8
1	0.13	0.42	17.6 lb. aluminum	
2	0.09	0.39		7
1	0.11	0.42	22 lb. aluminum	
2	0.09	0.38		9.5
1	0.13	0.37	17.6 lb. aluminum	
2	0.09	0.35		5.5
1	0.09	0.34	17.6 lb. aluminum	
2	0.09	0.31		9
1	0.09	0.44	22 lb. aluminum	
2	0.08	0.37		10
1	0.07	0.33	309 lb. Fe-Si½	
2	0.07	0.32	253 lb. aluminum	3
1	0.09	0.36	309 lb. Fe-Si½	
2	0.08	0.34	253 lb. aluminum	5.5
1	0.09	0.39	309 lb. Fe-Si½	
2	0.09	0.39	253 lb. aluminum	0
1	0.09	0.32	187 lb. Mn per 108 tons	
2	0.08	0.36	17.6 lb. aluminum	10
1	0.10	0.30	176 lb. Mn to 115 tons	
2	0.07	0.33		11
1	0.09	0.34	132 lb. carbon	
2	0.09	0.32	26.5 lb. Ca-Si	6
1	0.09	0.34	154 lb. carbon	
2	0.09	0.33	26.5 lb. Ca-Si	3
1	0.10	0.35	110 lb. Mn to 108 tons	
2	0.10	0.39	110 lb. carbon	
			26.5 lb. Ca-Si	2.5
1	0.07	0.28	270 lb. Mn to 107 tons	
2	0.11	0.37	132 lb. carbon	
			26.5 lb. Ca-Si	0
1	0.08	0.30	165 lb. Mn to 108 tons	
2	0.10	0.36	132 lb. carbon	
			26.5 lb. Ca-Si	4
1	0.52	0.71	750 lb. Fe-Si½	
2	0.51	0.71	62 lb. aluminum	0
1	0.69	0.86	750 lb. Fe-Si½	
2	0.68	0.85	62 lb. aluminum	1
1	0.58	0.60	750 lb. Fe-Si½	
2	0.57	0.59	62 lb. aluminum	2

Conservation of Chromium

The availability of chromium for steel requirements was next considered. The most interesting discussion centered in the use of Chrom-X, a product made from low-grade chrome ores in Canada and which during the past year has found greater and greater acceptance.

J. H. McDonald, of Algoma Steel Corp., reported in considerable detail his experience with this product. He stated that the procedure followed at Algoma with ferrochromium was to bring down the carbon in heat sufficiently below the specification to allow for carbon in the alloys, take a test for carbometer and add silicomanganese to specification; 8 min. after manganese, ferrochrome was added in the furnace and held for 22 or 30 min. in all. The yield from chrome was figured at 88 per cent. Making the same heat with Chrom-X the same procedure is followed to bring the heat low enough in carbon to allow for the carbon in the alloys. Silicomanganese is added in the furnace and 10 min. later the heat is tapped. Chrom-X is added in the ladle.

The yield from Chrome-X is figured at 95 per cent. It is exothermic and the heat does not have to be as hot as when ferrochromium is used. There is a saving in time of 22 min. per heat, a 6 per cent saving in chrome and no cold heats.

Chrom-X is made from ground ferrochrome-silicon, mixed with calcined chromite and a suitable ignitor.

Chrom-X has been used at Algoma since September, 1938, and on all steel up to 1.20 Cr it is added in the ladle. The same applies to S.A.E. steels calling for chrome-nickel, chrome-molybdenum and chrome-vanadium. Results so far as grain size, inclusions, tensile, and impact test, are satisfactory.

When 4 to 6 chrome steels are made, the Chrom-X is added in the furnace; that is, low carbon Chrom-X, 0.05 and under. There is a kick-back on phosphorus. A charge low in phosphorus has to be used. Algoma procedure is to charge all low phosphorus scrap, 5 per cent burnt lime, 2½ per cent coke. When melted, if nickel or molybdenum is required, they are added and the heat boiled down to

0.08 carbon. Then 2 per cent of 50 per cent ferrosilicon is added to the bath, about 6 in. later Chrom-X is added, and about 15 min. after Chrom-X a small addition of limestone is made; this creates an action and removes the silicon from the bath to the slag, and chrome from the slag to the bath; about 2 per cent of stone is added in all.

A heat is tested in core sand molds and when the silicon is low enough in the bath a roughing of the top of the test is noted. The heat is generally ready to tap 40 to 60 min. after addition of the Chrom-X. In making 11 to 13 per cent chrome steel, the same procedure as above is used. The yield is about 81 per cent in the furnace. This probably could be improved very substantially if slag were to be removed from the bath before making additions.

To date, Algoma has used 1,250,000 lb. of high carbon and 150,000 lb. of low carbon Chrom-X. The heat available to melt the high carbon material is S1 + C about 6 per cent, which is oxidized with nitrate. In low carbon Chrom-X it is Si + chromate and chromite.

E. L. Ramsey, of Wisconsin Steel Co., stated that his company had tried Chrom-X about a year ago. It was placed in the molds—a 10,000-lb. mold was used, and Chrom-X was added until 100 points of chromium was secured. Examination for cleanliness disclosed no difference than when ferrochromium was used. Several heats have been made at Wisconsin, up to 1 per cent chromium (SAE 5100 series), the Chrom-X being added to the ladle. Efficiency was 95 + per cent, as compared with 90 per cent efficiency when ferrochromium is used with the same carbon analysis. Mr. Ramsey stated that no difference in cleanliness, grain size, etc., was found, and in general the use of Chrom-X results in steel every bit as good as that made with ferrochromium.

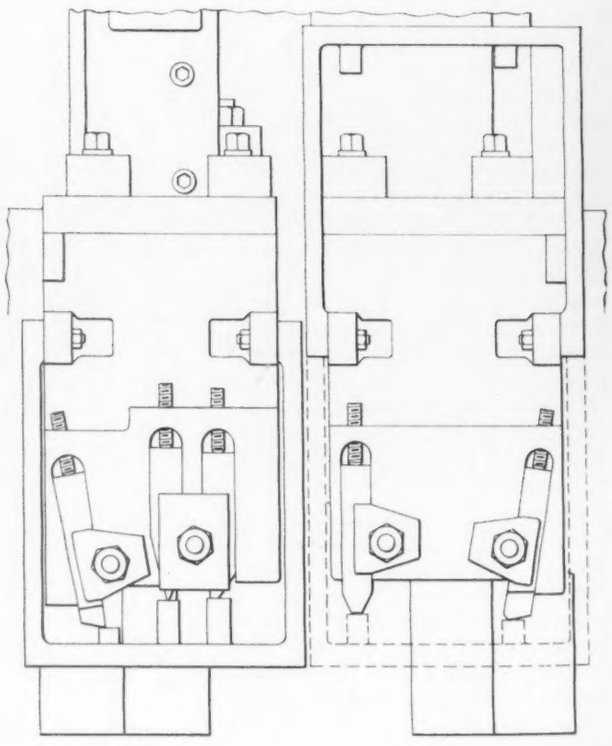
W. H. White, Pittsburgh Rolls Division of Blaw-Knox Co., acknowledged a rather regular use of Chrom-X with quite satisfactory results being obtained. H. M. Griffith, of Steel Co. of Canada, Ltd., stated his company had made 30,000 tons of SAE 5150, 4150, 3135, 6140 steels, using Chrom-X. Results have been very satisfactory. Efficiency has been in the neighborhood of 96 per cent. Some cost savings have resulted, and average cleanliness rating has been most satisfactory. H. R. McCoy, of Ohio Steel Foundry Co., reported on 4 to 6-Cr heats in the acid open hearth, using Chrom-X. About 4600 lb. of Chrom-X was used in the bottom of the ladle. The analysis of a typical heat would be 0.29 C, 0.68 Mn, 0.053 P, 0.031 S, 0.60 Si, 4.75 Cr, and 0.48 Mo. Recovery and quality were both reported as being quite satisfactory.

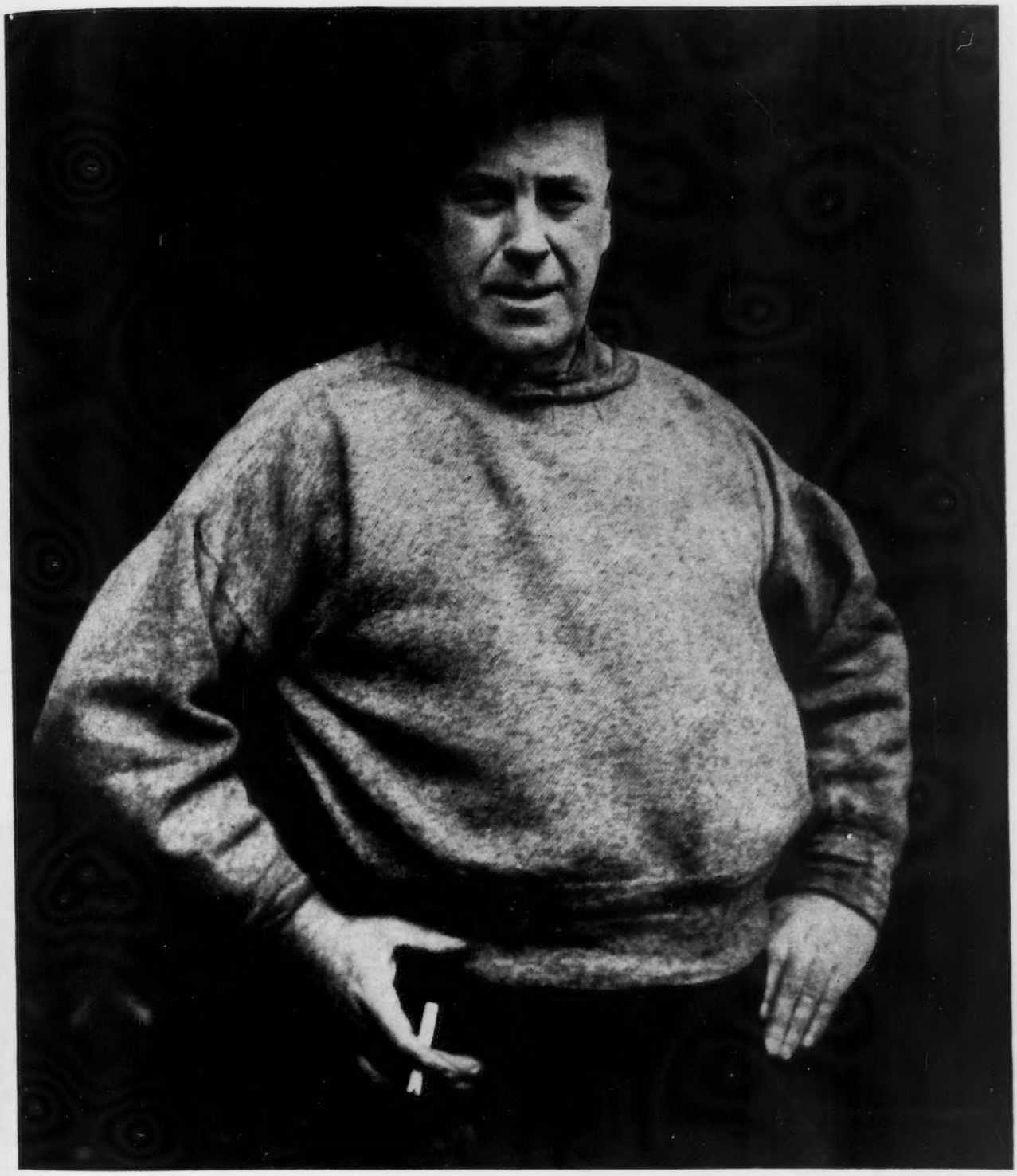
Next, the question was asked as to the best place to add the Chrom-X—in the bottom or in the top of the ladle. Mr. Ramsey preferred adding in the bottom; Mr. McDonald generally adds in the bottom, but stated that it made no great difference; Mr. Baldwin adds in the bottom and figures on securing 96 to 97 per cent yield.

The question next came up as to carbon pickup. Mr. Griffiths stated that his experience showed about 12 points carbon for each 1 per cent chromium, at 92 per cent recovery of chromium. Mr. Sims, of Battelle, affirmed this carbon recovery, and pointed out that the proportion of carbon pickup naturally showed up different, depending on whether the base steel was low carbon or high carbon.

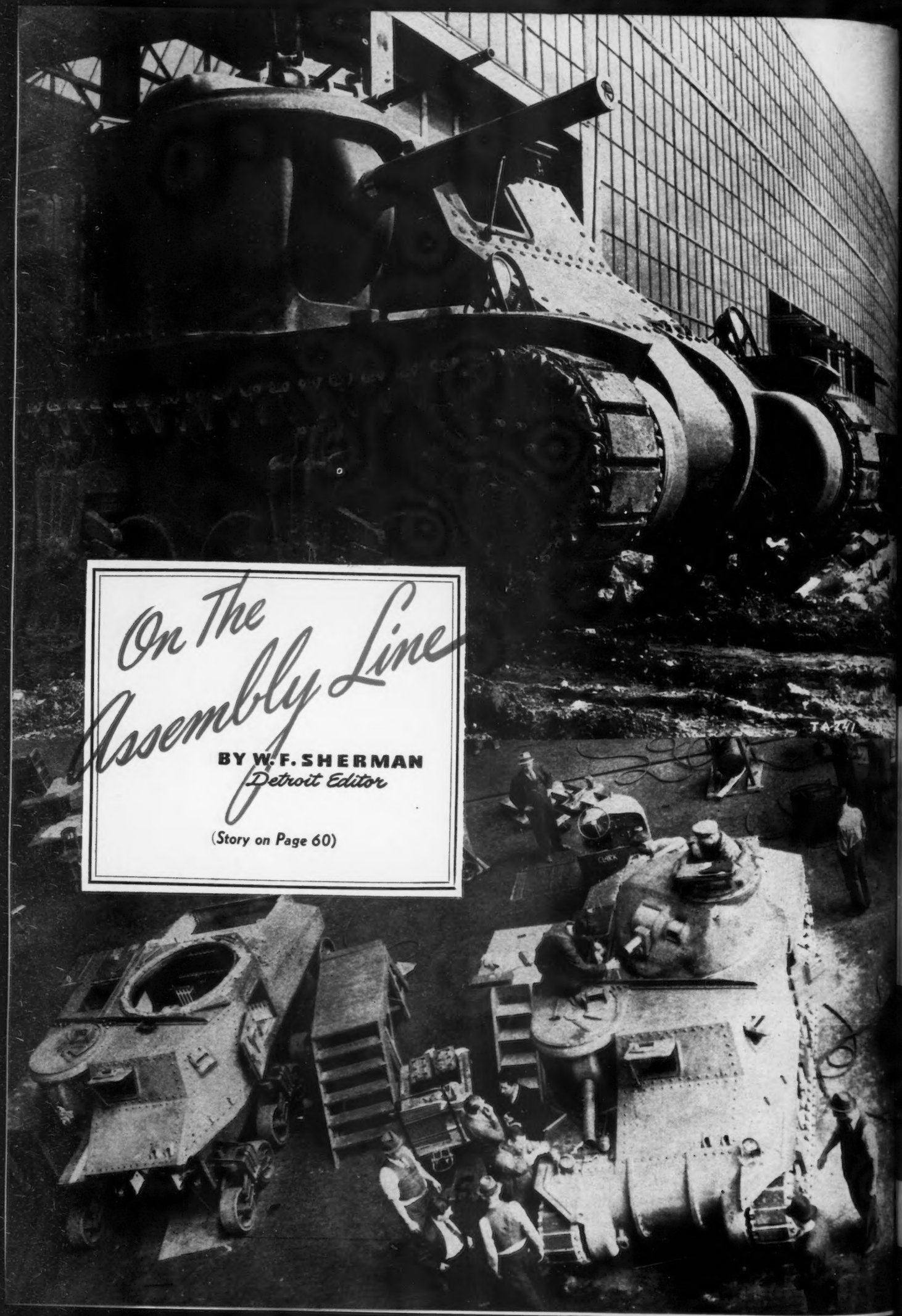
Built-In Gage Reduces Carbide Tool Set-Up Time

INCREASED continuity of production has been obtained on a battery of Bullard six-station Mult-Au-Matics for machining automobile flywheels by reducing "down" time through two devices: the use of Carboloy tungsten carbide cutting tools to increase number of pieces per grind—and the use of simple built-in swivel type gages to speed up tool setting. Basically, the gage consists of a U-shaped swiveling forging, the arms of which are pinned to the tool holder in such a manner that the gage can be swung down quickly for checking or resetting of tools. The U-shaped forging itself is fitted with hardened buttons against which the tools are brought to bear with correct size feeler gages inserted between the buttons and the tool. The sketch shows one tool slide with the gage down in position for setting up the tools, the other swung up out of the way.





THE "FEEL" OF BRASS. Brass isn't just a matter of pyrometers and chemical analyses. It's also a matter of men like Tom Carroll. For over 35 years, Tom has been casting brass for Revere Copper and Brass Incorporated. Today, he and thousands of other Revere workers like him stand behind defense orders, as they always have stood behind Revere metals. They furnish the *human touch* in fabricating copper, brass, bronze, and other copper-base alloys. In fostering this *human touch*—as well as research and plant modernization—during the depression years, Revere has been well able, in the present emergency, to meet the nation's defense needs. Just as in the brighter times coming, Revere will meet the demands of a new vitalized American industry. Revere Copper and Brass Incorporated, 230 Park Avenue, New York.

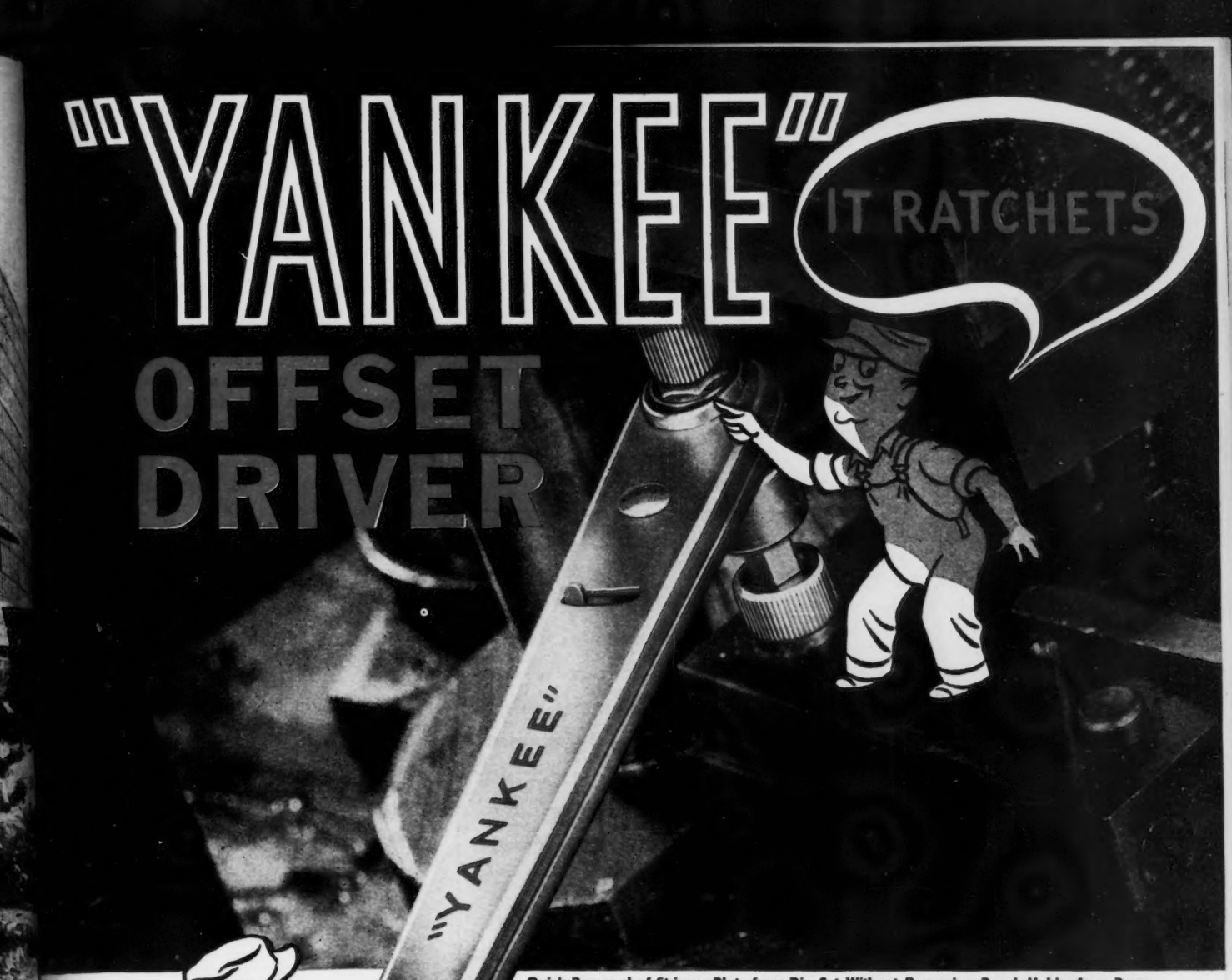


On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

(Story on Page 60)

"YANKEE" OFFSET DRIVER



Quick Removal of Stripper Plate from Die Set Without Removing Punch Holder from Press

FOR tight jobs like this you've been wanting close-quarter tools with "Yankee" speed and power. Now you can get them! See this new "Yankee" No. 3900. "Yankee" gets IN to the job. It ratchets. Job's done! "Yankee" Adapters take care of almost any and every type of screw. Bolts, too.

"YANKEE" Offset Ratchet Drivers are available in sizes to meet practically any close-quarter condition in driving screws or bolts. With these new "Yankee" Offset Tools there are no "hard-to-reach" screws!

NO. 3900 — ACTUAL SIZE

"YANKEE" ADAPTERS FOR OFFSET DRIVER NO. 3900

No. 3901 SCREW DRIVER 5/16" x .045	No. 3902 SCREW DRIVER 1/2" x .060	No. 3911 HEX KEY 3/16"	No. 3912 HEX KEY 7/32"	No. 3913 HEX KEY 1/4"	No. 3914 HEX KEY 5/16"	No. 3921 SQUARE DRIVE 1/4"	No. 3922 SQUARE DRIVE 9/32"	No. 3923 SQUARE DRIVE 3/8"	No. 3931 PHILLIPS BIT 1 POINT	No. 3932 PHILLIPS BIT 2 POINT	No. 3933 PHILLIPS BIT 3 POINT	No. 3934 PHILLIPS BIT 4 POINT

ORDER FROM YOUR MILL SUPPLY HOUSE. For complete showing of this new speed line of "Yankee" Offset Drivers . . . Adapters . . . Offset Kits,—Write for Offset Tool Folder "IA."

NORTH BROS. MFG. CO., PHILADELPHIA, U.S.A.

DETROIT — Automobile previews in Detroit have always been spectacular, but no product of the city's assembly lines has ever been presented as dramatically as the Chrysler-produced M-3 medium tank which roared from the assembly floor of the new Tank Arsenal last Thursday before an audience of 3000.

Cannons and machine guns blazed blanks and belched flame as the "pilot" tank from the assembly line roared out an open door, around the corner of the huge arsenal and onto a rough test track. Powered by a 400-hp. aircraft-type engine and driven by a skilled crew of Army tank pilots at its maximum speed, the tank crashed through trees, snapped off "planted" utility poles, clambered through a mud hole and water pit and smashed its way through a couple of frame house structures. No more colorful, or noisier, introduction could have been planned.

Second Tank Surprises Army

Climaxing the "preview" of the tank, K. T. Keller, Chrysler's president, and Eddie Hunt, operating manager, pulled pilot tank No. 2 "out of a hat," to the complete and unfeigned surprise of the audience and the greatest concentration of Army generals ever seen in Detroit. This second tank was Keller's surprise for the Army, since it was not generally anticipated that this hand-built model would be completed so soon. In fact, instructions given to the operating crews before the preview read, "if the second tank is completed and will run"—indicating that it was rushed to completion to be ready for the showing.

Important guests at the affair were machine tool suppliers and suppliers of other equipment and materials for the Arsenal and for the tanks. In fact, to them and the production experts with which Chrysler has staffed the Arsenal, went the accolades bestowed by Keller and Maj. Gen. Charles M. Wesson, chief of ordnance. The greatest burst of applause was that which occurred when Keller presented Eddie Hunt to the audience, which included the 1000 workers now on the job in the Arsenal. It was equaled, however, when the Governor of Michigan called for active cooperation of labor with management for defense production.

First Monster Is Gift

The first tank was presented as a voluntary gift paid for by salesmen, dealers and distributors of the Chrysler Division.

These tanks, it was stated by Brig. Gen. G. M. Barnes, were completely redesigned last summer for new armor, performance and fire power. They incorporate cast armor plate which in some places is 2½ in. thick. It is contoured to avoid having any flat surfaces exposed directly to gun fire, and the rounded corners also are designed to increase its resistance to attack. Performance includes a maximum speed estimated unofficially at 50 miles an hour. Armament is its most outstanding feature, since it carries a 75 mm. cannon with a firing range of 15,000 yds., a 37 mm. anti-aircraft gun which can also be used for point-blank fire, and four machine guns, two 50 caliber and two 30 caliber. A crew of seven, wearing heavily padded helmets, operate the tank. They have handy a stack full of submachine guns which can be fired out of portholes for close-range work on "such small fry as opposing infantry." The official description of the tank says that it weighs 28 tons, is 18 ft. in length, and is powered by a Wright radial engine which is muffled so the tank makes little more noise than a truck. Another novel feature of the tank is the upper turret, which revolves.

• Newest product of Detroit assembly lines, a 28-ton tank, crashes through houses, snaps off telephone poles, flattens trees in roaring, flame-belching preview at Chrysler's new arsenal.

Fire Power Heavier in U. S. Tank

Of general interest is the claim that the M-3, the largest American tank now in production, is credited with firing power as heavy, or heavier, than any tank that has been used in Europe. Incorporating many lessons from the battles of last spring, the use of a 75 mm. gun is a direct result of lessons learned in the battle of France, when heavy field artillery was required against Nazi tanks.

Chrysler defense activities have taken another spurt in the last week with the organization of a staff for a Gun Arsenal. As a result of an agreement reached with the Navy in the middle of April, Chrysler will manufacture 40 mm. rapid firing anti-aircraft guns. These are weapons intended for combating dive bombers. Already, orders for more than two million dollars worth of machine tools have been placed. Tooling operations are expected to begin as soon as the staff can complete studies and determine what other equipment will be needed. Some additional plant construction will be necessary, but manufacture of the guns will be spread among various Chrysler plants. Additional factory space will be provided at the Chrysler Jefferson plant and the DeSoto plant. Parts will be manufactured in the Highland Park, Dodge Main, Plymouth, Newcastle (Ind.) and Airtemp (Dayton) plants. Other machining and final assembly will take place in the Lynch Road plant. Production schedules call for 300 guns a month.

Frank J. Morisette, general staff master mechanic of Chrysler Corp. since November, 1940, has been appointed operating manager of the gun arsenal.

* * *

Auto Assemblies Rise To 108,165 Units

Detroit

• • • **The level of automobile** output is reflecting Ford's resumption of production. Assemblies increased to 108,165 units last week compared with 99,945 in the previous week and 101,405 in the corresponding week of last year, according to Ward's Reports, Inc.

"It Machines More Easily" . . .

Say Users of this Stainless

These Paint Spray Nozzles are machined at 175 feet per minute from Carpenter Free-Machining Stainless Steel.

"Take drilling and threading, for example. Chips clear more swiftly, the finish is better. Often we can get away without grinding close tolerance threads. Machining speeds are higher. We don't need to specially train operators to handle stainless. Tools need sharpening less often."

In comments like these, customers express a real satisfaction with Carpenter Free-Machining Stainless Steels. From these steels, they are getting more than corrosion or heat resistance. They are getting that special ease of working which Carpenter has always tried to put in Carpenter steels —that freedom from production difficulties which makes for lower unit costs and faster output.

Even today, under the stress of capacity mill production, the laboratories of Carpenter continue their work. They are searching for still easier-to-work stainless steels, still simpler methods. Later on, when new markets must be opened, new products designed, they will be ready to give Carpenter customers new sales and manufacturing advantages.

THE CARPENTER STEEL CO.

121 W. Bern Street, Reading, Pa.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington

BY L. W. MOFFETT
Washington Editor

• Government's passive attitude toward defense strikes, particularly in coal mines, disturbs steel industry's leaders . . . Loss of steel output because of bituminous walkout would have met needs of ugly duckling ship program.

WASHINGTON — A trifle shocked from developments within the past 30 days, the most recent ones carrying a 10c. an hour wage increase, a temporary freezing of prices, and the spectre of more and more control, the steel industry is attempting to carry on an "all out" production while having been faced last week and part of this week with holdups and shutdowns occasioned by the coal strike. Even after the strike is settled beehive coke ovens will require at least 10 days of heating for production of fresh blast furnace fuel.

Loss of steel production, a direct result of halted beehive coke output, is only one of the disastrous results of the extended coal tieup. What some industrialists and government officials fail to see in the background, or the latter find it politically expedient to disregard, is the disruption of those finely balanced production schedules which steel men labored over so long in order to distribute available material as equitably as possible among national defense contractors, and commercial users. It is a situation like this, reflecting the government's relatively passive attitude toward labor disturbances, that has developed what the Administration so strongly criticizes as widespread public apathy toward the war dangers this country faces. Hence the matter works back to the point where the Administration itself is responsible for much of the so-called complacency of which it complains.

Government Will Take Care of Us

The Administration clearly sees that the public at large has not at all comprehended the seriousness of the world situation. The public does not want to put away its toys, even though it senses that it really should abandon them and grab the hose to quench the fire that rages nearby. The public at large cannot be wholly to blame for its attitude. It has been fed the past few years on the idea that it need not exert itself; that the government would take care of it—with the people's money.

In terms of ugly ducklings, a rough estimate would indicate that the amount of steel not produced because of the coal tieup would, to a substantial degree, take care of this ship program. Or perhaps steel ingots not produced and which cannot be made up because the industry, prior to April 1, was already operating at top level, might have been useful for national defense buildings, tank parts, Army trucks, or many other items so urgently needed at the present time.

Still these troubles are probably insignificant when related to the ones which are now only casting their shadows. Realists in the steel and other metal working industries are the least surprised at the movements set in motion within the past few months.

Hard thinking executives who look back to the scenes in 1917 admit that many of the controls already set up for industry and those yet to come are the result of excesses during the first World War period.

Long ago American business of its own volition set about to make sure there would be no name calling. That they have succeeded as a group so far is demonstrated by the fact that the word "profiteer" has not been leveled at any section of American industry.

Whether or not the majority of business men can see the handwriting on the wall, as do the more astute executives, remains to be seen. If they do not, then the realization that there will be as little profit as possible in this national defense endeavor will come suddenly and not in the far distant future.

It is already being taken as a matter of course by some steel executives that the fixing of steel prices is a forerunner of strict price control with little or no changes allowed unless the facts warrant, and only then to an amount believed to be reasonable by government authorities. There definitely will be no repetition of World War prices. It is significant that at a recent press conference Ernest T. Weir, touched heavily on the tax and profit situation.

Weir Warns of Inflation

Mr. Weir pointedly said that no steel company or any other organization in times like these when the country is preparing for national defense, could hope to earn profits at the same rate as may be possible under normal conditions. Going farther the National Steel board chairman warned that no company could even hope to be allowed to raise its prices to an extent which would absorb increased taxes. Such a move, he said, would aid and abet a wild inflation, a condition which every sensible business man opposes. He indicated that taxes should be accepted as a penalty to be paid toward the cost of preparing this country.

These observations expressed in private and in some cases in public by some of the nation's leaders are an indication not that they necessarily approve of measures now being taken, but simply that they would go to almost any length to prevent an aftermath such as most thinking business men believe to be inevitable, unless the "preventive" groundwork is laid now.

Pardon us while we help speed up your production . . .

THIS G-E ENGINEER is checking the brightness of the fluorescent powders that are the life blood of G-E MAZDA F (fluorescent) lamps. It's one of many tests that may directly concern you, because if you are using these cool tubes of "daylight" in your plant, you may already have seen how their new higher levels of illumination can increase production, decrease rejects, and improve employee morale!

The high efficiency and long, dependable life of the G-E MAZDA F lamps you use are among the many results of a multi-million dollar program of research and development. This program can be traced back to Thomas A. Edison, inventor of the first practical incandescent lamp . . . and the constant search for ways to make lamps give more and more light for the current consumed.

SO IF YOU WANT *maximum light output for current consumed* from fluorescent lighting . . . if you want lamps that *stay* brighter *longer* . . . SEE your G-E supplier.

G. E. does not make fixtures but your G-E MAZDA lamp distributor can show you a full line of certified Fleur-O-Lier or RLM industrial fixtures, with certified ballasts and starters, providing good power factor, equipped with G-E MAZDA F lamps, ready to hang up and turn on. Get in touch with him today! Or write General Electric for the free offer below!

FLUORESCENT FACTS:

Edison didn't invent G-E fluorescent lighting, but curiously enough he worked on the problem and applied for a patent on a fluorescent lamp as far back as 1896. General Electric has had to develop and perfect scores of devices, processes, and materials in order to produce today's tested, high-efficiency G-E MAZDA F lamps.

G-E MAZDA F LAMPS

GENERAL ELECTRIC

Made to stay brighter longer

FREE OFFER Amazing new scientific toy the "Seeing Spinner" shows how better light speeds seeing. Also new illustrated booklet, "Let Fluorescent Lighting roll back the roof." Get both! Write on your business letterhead to General Electric Company, Dept. 166-**IA-E**, Nela Park, Cleveland, O.

Navy's Steel Needs Exceed 579,192 Tons

Washington

• • • **Secretary Knox** has announced that to complete its expansion program the Navy will require 579,192 tons of steel and 383,660,020 lb. of brass for ordnance materials. Of the steel requirements the bulk consists of 379,500 tons for armor plate and 165,397 tons for projectiles in sizes from 3 in. to 16 in. in diameter.

The other steel demands are 15,250 tons for projectiles for anti-aircraft machine guns, 7125 tons for bomb casings, 4400 tons for torpedoes and 7500 tons for depth charges and mines. Brass requirements are for cartridge cases, 122,366,200 lb. for navy guns, 3 in. caliber and above, and 261,294,000 lb. for machine guns and heavy automatic guns.

The Secretary of Navy declared that although it might well be said that lack of funds is no longer an obstacle to the procurement of necessary military items, it is equally true that production priorities now limit what can be done in much the same way.

"Where lack of funds has ceased to be a controlling factor, lack of production facilities has taken its place, at least temporarily," the Secretary said in explaining that expansion of production facilities fostered by the Bureau of Ordnance is being paralleled by other Bureaus of the Navy Department and by the Army and is necessarily controlled by priorities agreed upon by the Army, Navy and OPM. Machine tools were said to be the critical item in nearly all cases of plant expansion and the speed with which quantity production can be started is governed very largely by their availability.

During the first nine months of the current fiscal year, Secretary Knox stated, the Bureau of Ordnance expended or contracted funds totaling approximately $1,075,000,000 and it is expected that by the end of the fiscal year this total will have passed well beyond $1,500,000,000. In addition, it was stated, the Bureau of Ordnance will probably receive an initial allocation of $285,000,000 under the lend-lease program. The 1939-40 expenditures were approximately $185,000,000 and the past five year average was $115,000,000, the present expenditures indicating the expansion of the Bureau activities in providing ordnance equipment.

The funds obligated to date include a total of approximately $280,000,000 for expansion of production facilities, including the establishment of five new naval ordnance plants at Louisville, Ky.; Canton, Ohio; Macon, Ga.; Centerline, Mich., and Indianapolis, as well as expansion of existing naval ordnance plants.

* * *

Aluminum Eased for Non-Defense Consumers

Washington

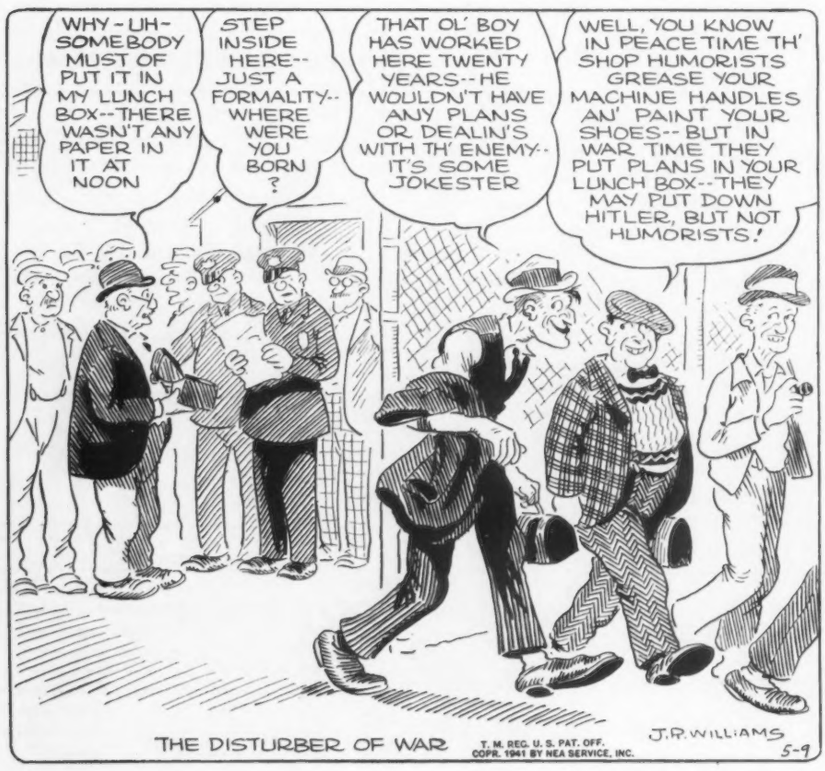
• • • **A formula for** distribution of low-grade aluminum, making it possible for non-defense industries to obtain larger quantities, is embodied in a supplementary order issued by OPM's priority division. The order increases the percentages of average 1940 shipments which consumers of low-grade aluminum may now obtain.

Under the terms of the former preference order, consumers whose orders fell into preference rating classes from B-2 to B-8 could obtain quantities of the metal ranging from a high of 80 per cent to a low of 10 per cent of average 1940 shipments from the same producers for corresponding purposes. The table indicated below indicates how these percentages are increased for consumers of the low-grade aluminum.

Preference Rating Classes	General Preference Order (remains in effect for all aluminum except the low-grade)	Supplementary Order for low-grade aluminum
B-2	80%	100%
B-3	70%	100%
B-4	60%	90%
B-5	50%	80%
B-6	40%	70%
B-7	30%	60%
B-8	10%	50%

The phrase low-grade aluminum, for which it was said there is little defense need, was defined in the order to mean "any copper type of aluminum alloy reduced from scrap containing at most 87 per cent of

THE BULL OF THE WOODS — BY J. R. WILLIAMS


WHY-UH-SOMEBODY MUST OF PUT IT IN MY LUNCH BOX--THERE WASN'T ANY PAPER IN IT AT NOON
STEP INSIDE HERE--JUST A FORMALITY--WHERE WERE YOU BORN ?
THAT OL' BOY HAS WORKED HERE TWENTY YEARS--HE WOULDN'T HAVE ANY PLANS OR DEALIN'S WITH TH' ENEMY--IT'S SOME JOKESTER
WELL, YOU KNOW IN PEACE TIME TH' SHOP HUMORISTS GREASE YOUR MACHINE HANDLES AN' PAINT YOUR SHOES--BUT IN WAR TIME THEY PUT PLANS IN YOUR LUNCH BOX--THEY MAY PUT DOWN HITLER, BUT NOT HUMORISTS!
THE DISTURBER OF WAR
T. M. REG. U. S. PAT. OFF. COPR. 1941 BY NEA SERVICE, INC.
J.R.WILLIAMS
5-9

aluminum, the remaining constituents of said alloy being composed of at least 6.5 per cent copper and 1.5 per cent zinc, or if said remaining constituents do not contain 1.5 per cent zinc, they shall contain at least 1 per cent of either nickel, manganese, tin, lead or bismuth, or at least 1 per cent of a combination of nickel, manganese, tin, lead or bismuth."

* * *

Bauxite Output in U. S. Can Rise Quickly

Washington

• • • **A new survey** by the Bureau of Mines shows that domestic bauxite production could be multiplied swiftly in case an emergency disrupted imports, according to the OPM Metals and Minerals Section.

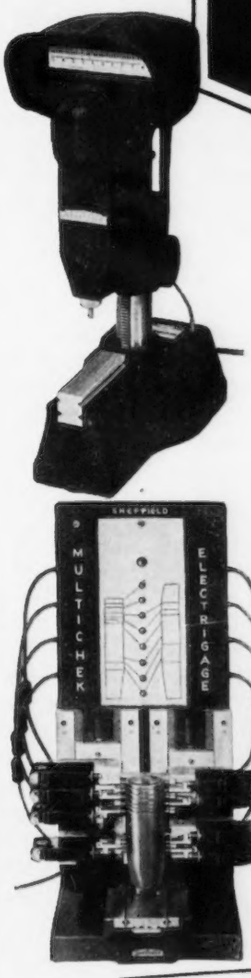
Pointing out that about 60 per cent of the supply is now imported from Dutch Guiana while the remainder comes principally from Arkansas, with minor amounts from Alabama and Georgia, the Metals and Minerals Section issued this statement:

"As long as shipping is available, the policy will be to use the imported ores in about the same proportion as in recent years. This is done to conserve the very limited domestic supply and to hold that supply back for possible use in an emergency when shipping might be wholly unavailable.

"It does not mean that domestic production is being held back for the sake of more cheaply available foreign ores. As a matter of fact, the production from domestic sources is being increased to meet about its proportionate share of the largely expanded demand.

"Domestic production in 1941 is running 50 per cent higher than in 1940."

The bureau survey was said to show that domestic bauxite production can be multiplied threefold in two months and five-fold in four months, with little new equipment beyond that already at the mines or in construction. Sufficient domestic and South American supplies of bauxite appear to be available to meet the greatly expanded aluminum production program required by the defense effort, the Section concluded.



Our national safety today depends on the speed with which we can produce those products necessary to vital defense—speed coupled with precision in machined products.

Speed and Precision are the outstanding characteristics of those Sheffield Gages utilizing the Reed Mechanism—notably the Multichek Electrigage and the Visual Gage, used in checking dimensions of manufactured and purchased parts, tools, production and master gages.

The action of the Reed Mechanism is instantaneous and always absolutely positive. The Reed Mechanism employs no gears, knife edges or levers and there are no rubbing contacts in its action. It is never subject to frictional wear. The use of this mechanism makes Sheffield Gages the most rapid precision instruments available.

If you are engaged in peace time production or national defense work, write for descriptive data on Sheffield Gages.

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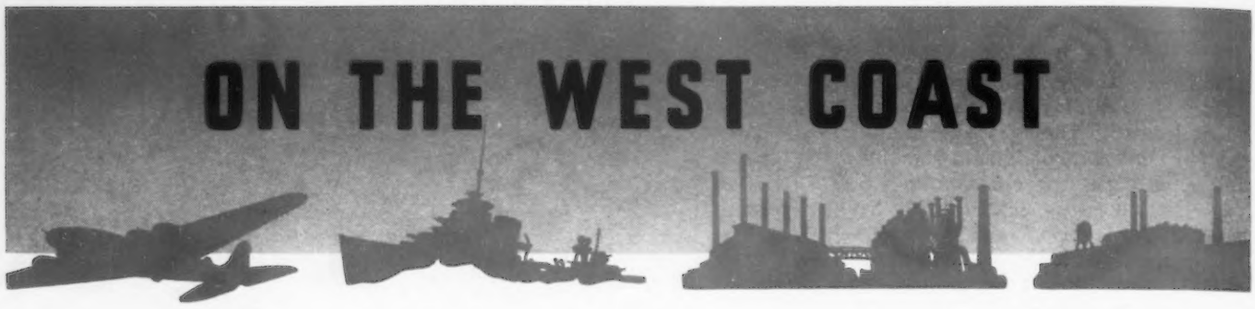
GAGE CORPORATION • DAYTON, OHIO, U.S.A.
MASTER GAGEMAKERS



SAN FRANCISCO — Few far Westerners doubt that Henry J. Kaiser, as a top flight construction and defense industry entrepreneur, has the courage, managerial ability, and organization, to create a steel capacity of **1,250,000** tons annually in Utah, Oregon and California, as he said he hoped to do last week if governmental approval and financial backing is forthcoming.

This new capacity would be about a third again as large as that of the combined capacity of all far Western steel producers at present. Not much more than a year ago, Mr. Kaiser said he would and did build a cement plant with capacity approximately equal to that of all other Coast cement producers combined. His backing and associates range from the big Six Companies' contracting organization which joined his entourage during the period of big dam construction, through the Todd Shipbuilding Corp. with which these interests had agreed to build some 213 ships at last count, to the United States Government, which is financially interested in a $12,000,000 magnesium plant under construction below San Francisco.

The steel proposal is merely the largest and latest in a string of undertakings which show that Mr. Kaiser either has unlimited faith in the future industrial expansion of the West Coast or that he believes that war demands will continue for many years—probably both.

War Outlook Will Decide

If Uncle Sam decides to advance most of the necessary capital for the steel undertakings, it will be at least partial confirmation that the government sees a long period of war emergency during which it wants to take no chances on inaccessibility of the far West to Eastern steel production. The dark glasses through which Uncle Sam views emergency requirements are not long range binoculars, and the probable peace time requirements of the region would not be paramount in its calculations.

• Kaiser steel proposal considered as defense measure . . . greatly enlarged market would be required for peace time consumption . . . aircraft standards group speeds mass plane production . . . Russian ships flock to coast repair yards . . . machinists' controversy unsettled.

Mr. Kaiser hopes to erase his difficulty in getting plates for his far Western shipbuilding project by the new production. His potential annual plate market, assuming Pacific Coast shipbuilding continues to expand at the present rate, could consume approximately one-half of his capacity tonnage as long as the emergency lasts, providing proper rolling facilities were installed. This calculation excludes as a possible customer Bethlehem Steel Co., which is a principal West Coast shipbuilder, but which probably would not be first in line when the box office opens for the new production.

The total West Coast steel market in normal times before the emergency was between 2,000,000 and 2,500,000 gross tons annually, much of it made up of tubular products and tin plates. Plates accounted for about 250,000 tons. Present estimated far Western capacity, operating and building, is somewhat under one million tons, much of it in bars, light shapes, wire and other light products.

Niles Plant to Be Expanded

Meanwhile, construction is already under way to expand the electric furnace capacity of the Niles, Cal., plant of the Pacific States Steel Corp. to 150,000 tons annually. Operating changes include the addition of one new furnace. Production will be devoted almost entirely to alloy steel.

Four aircraft standards engineers and a Navy plane inspector who met in Los Angeles in June, 1939, propelled a force which is giving the aircraft industry a big shove toward mass production. From these five men—Lou Cummaro and Ed Kasnicka of Lockheed, Mearl Chapman of Douglas at Santa Monica, Curtis Newcomb of Vultee, and "Trip" Tripolitis, on the staff of the inspector of Naval aircraft at Santa Monica—has developed the National Aircraft Standards Committee. This month the Western division of the committee held its 31st meeting, and the Eastern division its 20th. Several standards have been completed for final approval and first proposals for a number of additional standards to be incorporated into designs for military and commercial aircraft have been prepared.

The standards body now is representative of nearly all principal American aircraft manufacturers. All shirt stuffing is left at the door at committee meetings, and the representatives work on a first name basis to develop wider standard practices within their separate companies and among themselves. The first-born Western group is now headed by Henry Gledhill, Jr.,

of Douglas at Santa Monica, and the younger Eastern group by Jack Thompson of Glenn L. Martin. Last November the two committees, meeting jointly for the first time in St. Louis, elected Bill Smith of Bell, the first national chairman.

Advisory Data Exchanged

Agenda of the Eastern and Western groups is separate but is prepared and carried out with full interchange of advisory data. Glen A. Aron, standards engineer for Northrop Aircraft, Inc., one of the most active and enthusiastic members of the committee declared that "occasionally the groups are inclined to step in each other's way, which is only normal in an industry as widely spread through the country. It's an inspiration, though, to see so many separate opinions and previously established practices in the various companies gradually giving way to practical agreement and accepted standards."

Sub-committees are assigned in both Eastern and Western groups to handle problems in each of several airplane engineering fields, which are assigned to them for study by the full committees. The sub-committee reports its progress to the full group at each meeting until the standard is completed.

After preliminary study the proposed standard is circulated to all members in work-sheet form, subject to further revision before final preparation. The final form is sent to the other coast for approval by its full committee, the members signing or withholding signatures separately. Such endorsement does not imply the use of the standard by the member's company, whose present practice may be at variance.

Standard's Use Not Compulsory

Mr. Aron points out that a three-fourth's majority is necessary to ratify the use of a design as an N.A.S. standard. The door is never closed to revision. No member company is compelled to use the new standard.

The fully endorsed standard is forwarded to the Army-Navy permanent working committee. The Army has already signified its readiness to accept such a standard, and the Navy is expected to approve also. This support is further backed up by the Aeronautical Chamber of Commerce, and the American Standards Association, but acceptance by the member companies has been the vital factor in the committee's growth.

By slow and cautious steps, relationships are being strengthened and inter-company confidence established. One West Coast company has sent voluntarily to other members a preliminary catalog of design data for sub-assembly parts for which both engineering design and tooling has been completed and put into practice. This preliminary "catalog" was accompanied by a letter from the chief engineer, offering the use of a more comprehensive collection, and encouraging the other companies to reciprocate. It is more than encouraging that such a spirit is spreading in such an important defense industry.

Shipyards of Wood Construction

The coast shipbuilding yards, growing like Jack's beanstalk with Vitamin B_1, are requesting less and less steel in their construction phases. Because of the delay involved in obtaining fabricated steel, nearly all projected yards will be of wood construction.

Everybody but Walter Winchell has been speculating over the influx into coast repair yards during the last three months of dilapidated ships flying the Russian flag. More than a dozen of the ships have appeared carrying light but valuable cargoes, chiefly fur and gold. Upon arrival, bids are taken for extensive repair work running from $75,000 to more than $200,000 per ship, with the average close to the latter figure. The Russians have spread the report that they expect to run up a total repair bill of close to $15,000,000, all of it to be paid for in cash. They declare that this work has been forced out of their own yards because of the presence of Naval construction. Local builders point out that construction work would not necessarily affect a repair yard, although the coast yards in which repairs are being carried out are in many cases close to American construction work.

Upon close inspection, the ships show evidence of German parentage, some of them having been fine liners half a century ago. They have apparently been out of service for some time, and whether they acquired Russian citizenship before or after retirement is not known. Agents infer that these tarnished swans will be put into transpacific service after repairs, but so far the last that has been seen of any of them has been their departure with heavy cargoes of machinery and construction equipment. Their age and condition would not warrant such extensive repairs in normal times, shipping men declare. To deepen the mystery, one salt who claims to have gone aboard all the vessels upon arrival, says he has noted a marked improvement in the discipline of the crews, composed of both men and women, since the ships first began to arrive. So far, neither the Navy nor the Maritime Commission has voiced public objection to the repair of these ships in the same yards where American merchant and Navy ships are being repaired, or converted to new uses, as long as careful patrol is maintained. No one has even whispered "Nazi." No doubt when the Winchells get hold of the story they will be quick to point out the havoc that could be raised by a small quantity of T.N.T. touched off in the holds.

San Francisco foundries and machine shops remain closed from the machinists' strike with no immediate prospect of settlement. Bethlehem Steel Co.'s Alameda, Cal., fabricating plant closed last week in deference to an AFL-CIO dispute over jurisdiction of crane operators. Formal ratification was given as expected to the Pacifict Coast shipyards labor agreement prohibiting strikes or lockouts during the national defense period and setting up a standard wage scale.

Fatigue Cracks

BY A.H.DIX

Time and a Half for Knife Boy

• • • Last week we aired the British Chancellor of the Exchequer's remark that if the time comes to choose between books and boots and magazines and milk, boots and milk will win.

As an antidote we offer this observation that Brian Aherne speared from the English *"Mrs. Beaton's Cook Book,"* which he happened to pick up on a movie set:

> **"In smaller houses where only two footmen are employed, it is permissible for the knife-boy to clean the boots."**

Moo no More My Elsie

• • • Some weeks ago we uttered here the wish that Elsie, the cow featured in Borden advertising, would get anthrax, not because of anything we had against her but for an udder reason: we got tired of seeing her in the advertising.

She didn't get anthrax and never will, for a truck she was riding in was hit by another truck and last week she died. Our deepest sympathy to the family, along with the pious hope that the Borden people will say "No one can take Elsie's place in our hearts or in our advertising."

He Drew on the Scandinavian

• • • We asked Bill (Armco) McFee where he picked up the word *skittley*. The Middletown pundit replies:

> "There is no such word; at least there wasn't until I added the letter 'y' to an old Scandinavian noun. Among the definitions of **skittle**, or **skittles**, is play, enjoyment. You remember the saying, 'Life is not all beer and skittles.'
>
> "So when I spoke of Frank Fletcher as having led a 'useful though not skittley life,' I meant in so many words that he sacrificed normal pleasures for career and the emoluments thereof."

That settles that, and now all we are left to wonder about is the arrangement of the nine pins used in skittles. Oue guess is that they are set up in the form of a diamond, set diagonally like this ⋅⁘⋅, which is all right, but provides no opportunity to gratify a life-time ambition of achieving a spare by skittering the No. 7 pin over and knocking down the No. 10 pin.

Wise Crack

• • • Lank, learned Emerson Findley, your favorite family journal's Central Western representative, writes:

> **"Your recent item about students getting through college by the extrusion process makes me think of something that I heard William Howard Taft say in reference to Yale graduates. In the case of a very few of them they were, he said, graduated cum laude. A still smaller number came through with a magna cum laude. But the vast majority got through mirabile dictu."**

If you will turn to the foreign phrase section of your dictionary, this is good for a belly laugh.

Stoppers

• • • 5 Tough Guys are We . . .—*The Texas Co.*

And congratulations to whoever selected Tom Carroll to model that Revere ad on page 57. He's as smooth a fit as an 11½-D vici kid shoe on an 11½-D foot.

Life History of a Scoop

• • • On Mar. 21 Jim Rowan, our news editor, wrote a note to Herman Klein, our Chicago editor, saying that he thought that if Herman went up to the Allis-Chalmers plant and got the facts on specifically just what and how much defense work throughout the industry was being held up by the strike, he would have a scoop, or a beat as we sharecroppers on the Fourth Estate prefer to call it.

Herman got the facts and wrote the story. It appeared in THE IRON AGE six days later, Mar. 27 issue, and then proceeded to sweep the country. More than a hundred newspapers picked it up, giving it more than ten million circulation. Shortly thereafter the strike was settled. We like to think the story had something to do with it.

When the Moon . . .

• • • For months we have been trying to fit in an item we clipped from the new equipment section of your favorite family journal. It read:

> "The unit serves to give warning when dies are worn and tells when the press is being overbottomed."

And now Chrysler sends us a press release about Kate Smith's new club coupe, which tells us that ". . . *the full-sized fixed seat gives Kate plenty of elbow room and leg room.*"

Aptronym

• • • We see that a United Airlines stewardess is named Martha Hopp.

But for a name with a wallop, we offer that owned by the advertising director of our contemporary, *True Story* magazine—Asa Blish. We have never met Mr. Blish, but we picture him as a man of rocklike quality, as unswervable from his course as an 80-ton tank.

We wish we had someone named Blish in our organization to whom we could turn over unreasonable requests. If, for example, an advertiser asked us to put a black and white page in right hand position, well up in the front of the book, opposite a bleed page in color, we would simply say, "Suppose you talk it over with our Mr. Blish." He, the advertiser, would wince and say, "Never mind, just do the best you can."

Pelican Gets Double Play

• • • The pelican broke into the ads twice last week. Lindberg Engineering Co. used an artist's conception of the big-billed bird with the headline "Is Your Heat Treating Department Built Like the Pelican?", and the American Engineering Co. tied up a photograph of a pelican with the caption, "Noted for Capacity," in advertising its fluid power pump. In the drawing the bird's distinguishing feature was much larger than in the photo, proving the superiority of art over nature. The ode, as you know, goes:

> A wonderful bird is the pelican,
> Its bill holds more than its belican.
> It can stow in its beak
> Enough food for a week
> And I don't see how the helican.

While our borrowed muse has the stage we would like you to know that Ernest C. (Clark Controller Co.) Roberts' favorite couplet is from Ogden Nash's "The Baby":

> A little talcum
> Always welcome.

Puzzles

. . . As you saw in an instant, last week's motorist could not average 60 miles an hour for two miles if he traveled only 30 miles an hour for the first mile. For 60 miles an hour means that he would cover the entire distance in two minutes, and at 30 miles an hour for the first mile he would use up the entire two minutes, requiring him to cover the second mile in nothing flat.

If the following convinces you that bridge problems are a waste of time and that you would be better off curling up with a restful book like *"Out of the Night,"* blame W. B. Stewart:

	S — A 3 H — A 4 3 2 D — A 2 C — None	
S — K J H — K Q J 10 D — K J C — None		S — Q 10 9 H — 9 8 D — Q 10 9 C — None
	S — 5 4 H — None D — 5 4 C — 6 5 4 3	

Clubs are trump. North leads and takes all eight tricks.

News of Industry

WOMEN IN INDUSTRY: In the U. S. scenes like this are uncommon. In England they are common and women drivers of trucks and buses (above) are taught all about the vehicles they drive. *Photo by Topical Press*

Each British Plant Has Air Raid Staff

Chicago

• • • **Underestimation of German** strength and Britain's final awakening to the urgency of its cause following Dunkirk was described for the Illinois Manufacturers' Association by Sir Kenneth Lee, chairman of Tootal Broadhurst Lee Co., Ltd., Manchester, England.

Explaining the Emergency Powers Defense Act which has avoided strikes or lockouts in England during the war, Lee stated that Minister Ernest Bevin has complete control over all persons and property. Enacted last October, the act provides the following regulations for industry and labor:

1. Existing negotiating machinery in any trade or industry shall continue to operate.

2. Disputes unsettled by negotiation are referred to arbitration, and decision is binding on all parties.

3. No strike or lockout can take place until the dispute has been reported to the Minister of Labor within 21 days.

4. National Arbitration Tribunal shall be appointed where negotiating machinery did not already exist and its decision shall be binding.

This legislation was supported by all political parties. Since eight workmen are required to produce the equipment needed for one fighting man, more than 24,000,000 producers are supervised and directed under the act.

During the early part of the War competition arose between employers for labor and the Labor Ministry scheduled certain occupations, making it illegal for employers in those industries to engage a worker without consulting the Ministry. For instance, those in the building, contracting and engineering trades cannot take each other's labor. "With the armed force growing, the need for women workers stepped up. This aspect of total war was not of our own choosing but is obligatory."

Safety and comfort of workmen is paramount. During bombardment of railroads and highways, billets were provided for workers who have been transferred from their homes. Kitchens and canteens are conveniently located for workmen. Nurseries are set up in the country for mothers who are working industrially. Health and recreation services are complete.

Britain has already learned that a seven-day week of 70 to 80 working hours does not produce maximum production from workers and orders have been issued to plants to reschedule hours according to their individual needs so that production is not reduced by fatigue.

As important as labor is the use of raw materials. Britain imported half its food during peacetime and nearly all its raw materials. Biggest problem now is getting sufficient ships to bring the food and raw materials England needs to go on. Rationing of goods is in effect. Cotton textiles are now produced on a basis of 20 per cent of 1939 consumption. Priorities govern distribution of materials. For instance, a bale of cotton cannot be broken without a license showing it will be used for an approved purpose.

Labor has built air raid shelters and first aid stations and has organized with management help each plant's own air raid staff. No extra pay was given or asked for this work. Business carries on—not as usual—but it carries on. Munition production is increasing but time is of the utmost importance. "Never before," the speaker said, "have the English been so united."

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111 Companies Produce Bomb Shelter Parts in Britain

London

• • • **At present** 111 concerns are manufacturing parts of the new standard indoor steel air-raid shelter. Of these, 51 are turning out pieces of the framework and the tops; six the side panels; 36 various other parts, and 18 are making the necessary bolts and nuts. Other concerns are manufacturing the spanners and hooks required to assemble the parts. The shelters are being distributed as fast as production permits.

'40 Rolled Zinc Output Off 7%, Value Up 10%

Washington

• • • **Contrary to general** industry trends in 1940, the production of rolled zinc in the United States declined 7 per cent in quantity, but owing to sharp increases in prices the value of the 1940 output was 10 per cent above that of 1939, according to the Bureau of Mines. The decline in the volume of production was attributed to a temporary slackening in demand for glass-jar covers resulting from smaller fruit crops, to a downward adjustment of plant inventories of rolled products, and to a strike that closed one plant for three months.

The quantity of rolled zinc produced in 1940 totaled 57,399 short tons valued at $11,635,000 compared with 61,882 tons valued at $10,614,000 in 1939. The output of sheet zinc and boiler plate increased 37 and 73 per cent, respectively, but that of strip and ribbon zinc declined 25 per cent. The latter accounted for 73 per cent of the total production in 1939 and 59 per cent in 1940.

There was a pronounced shift toward use of higher grades of zinc in 1940 when prime western and selected qualities comprised only 21 per cent of the total used compared with 43 per cent in 1939. There was a moderate rise in the proportion of brass special consumed and a very large increase in the use of intermediate brands of metal. The bureau said that it is believed that this shift reflects congested market conditions during the latter part of the year rather than technologic changes within the industry.

Zinc used in rolling was made up of the following grades:

	1939 Per Cent of Total	*1940 Per Cent of Total*
Brass special	39	41
Intermediate	2	22
Prime Western	24	16
High grade	14	14
Selected	19	5
Electrolytic	2	2
	100	100

Stocks of slab zinc on hand at zinc rolling mills were about 8200 tons at the beginning and 7700 tons at the end of the year.

Photo by WideWorld

ACCENT ON SHIPS: More and more ships like this are being built in the U. S. to replace war sinkings. This ship, the "President Van Buren," was to be launched today (May 1) at Newport News, Va. It is the sixth of seven new American President Lines' combination passenger and cargo ships.

Coming Events

May 1 to 2—The Galvanizers Committee, annual spring meeting, Pittsburgh.

May 5 to 7—American Gear Manufacturers Association, annual meeting, Hot Springs, Va.

May 8 to 9—National Metal Trades Association, annual convention Chicago.

May 12 to 14—American Steel Warehouse Association, annual meeting, Los Angeles.

May 16 to 17—American Society for Metals, conference on hardening of metals, Philadelphia.

May 19 to 23—American Society for Metals, Western Metal Exposition and Congress, Los Angeles.

May 22—American Iron and Steel Institute, annual meeting, Waldorf-Astoria, New York.

Parker Appliance Co. Begins $2 Million Expansion Program

Cleveland

• • • **The Parker Appliance Co.** here has launched an expansion program of $2,000,000 to increase plant facilities, financed by the company itself, Arthur L. Parker, president, announced. Further expansion may be expected later this year, he said. Parker Appliance specializes in fuel and hydraulic systems, vital now in aircraft production speedup. Employment now is about 1800, 150 per cent above a year ago, company officials said.

Gisholt, Heil Lift Wages

Madison, Wis.

• • • **Pay increases have** been granted by two Wisconsin industrial firms. Gisholt Machine Co., located here, gave 1000 employes raises ranging from 3 to 5c. an hour, retroactive to April 7. The Heil Co., operated by Governor Julius P. Heil, signed a contract with SWOC providing for increases totaling $175,000 yearly, plus $60,000 in vacation pay for 1500 workers.

Aluminum Wages Up 8c.

Pittsburgh

• • • **The Aluminum Co. of America** has increased wages 8c. an hr. for 17,000 hourly workers in five plants. The CIO had sought an increase of 15c. an hr. The company had granted a 2c. an hr. increase last July. The company and AFL representatives were expected to reach a similar agreement for 5800 workers at three other plants.

G-M Workers Average $41.24

• • • **General Motors Corp.** hourly workers in the U. S. earned an average of $41.24 per week in the first quarter of 1941, an increase of $6.25 per week over the corresponding period a year ago. The average work week was 41.9 hr. for the 1941 first quarter as against 37.4 for the same period in 1940. The average hourly earnings increased from 93.6c. in the first quarter of 1940 to 98.3c. in the first quarter of 1941.

More Strip Mills To Roll Ship Plates

Pittsburgh

• • • **Urgent need for ship** plates, the certainty that auto production for 1942 models will be cut 20 per cent or more and prospects for long term utilization of wide strip mill capacity are important factors which are expected to result in numerous large scale revamping of present wide sheet-strip mills in order to roll and finish ship plate.

National Steel Corp. has already embarked on such a program at Detroit and other companies have revised or are expected to revise mills and finishing ends to accommodate government orders.

While many strip mills have been capable of rolling out fair tonnages of wide plates, this activity has been restricted to some extent by lack of proper finishing facilities. Such conditions are expected to be rectified as soon as possible.

This action by the steel industry will result in a faster production of plates up to one in. thick to be utilized for the merchant ship and naval programs. This step may be the means of preventing steel priorities on ship plates although substantially the same thing is now in effect because of their inclusion on the critical list. There is, however, a vast difference between voluntary and priority action when it comes to the scheduling of available material.

The cut in production for 1942 model cars was probably partly brought on by the necessity for the production of ship plates as well as other wide flat rolled material thicker than usual sheet gages. It is also apparent that, as has been mentioned before, sheet deliveries in the future will definitely be affected by the production of plates on high speed mills.

Aside from the preparedness angle some observers see in this latest step of revamping, a forerunner of broader markets and uses of products from high speed mills. At least such changes in the mills which will allow plate production, will, during slack sheet demand, make for better utilization of the continuous mills which carry a tremendous maintenance and operating expense, especially when not fully engaged.

Where wide strip mills have increased the use of sheets and strip it is pointed out that a smaller, but nonetheless, increase in the use of plates for commercial purposes might follow after business goes back to purely commercial endeavor.

On the other hand there are some who believe that the wide strip mill has just begun to show its flexibility. Some companies have rolled skelp for pipe, others have regularly rolled plates and one mill had planned for the production of structural shapes by the continuous method on a sheet mill.

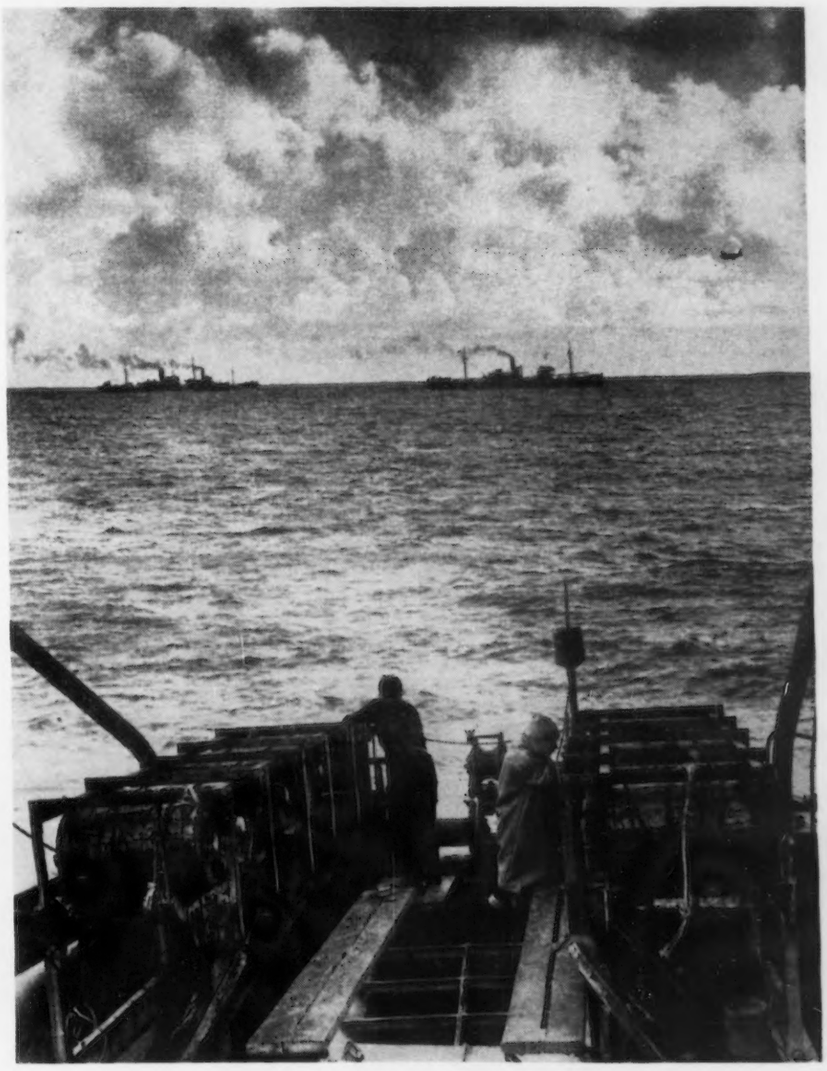
Senator Seeks Reopening Of McKeesport Tin Mills

Washington

• • • **Defense contracts** for Jones & Laughlin Steel Corp. to permit opening of the McKeesport tin plate mill were asked in a resolution submitted to the Senate last week by Senator James A. Davis, Democrat of Pennsylvania.

Senator Davis pointed to the resolution, which was approved by Liberty Borough, Allegheny County, as indicative that additional steel producing facilities still exist. He told the Senate that the unemployed steel workers in the locality could be put back to work if the plant were opened.

DEPTH-CHARGES FOR SUBS: With corvettes screening them on the sea and Coastal Command aircraft watching from the skies, convoys continue to arrive in Great Britain despite efforts of German submarines. Depth-charges shown in this photograph are the principal weapon of the corvette, many of which are being built in Canada. *Photo by Harris & Ewing*

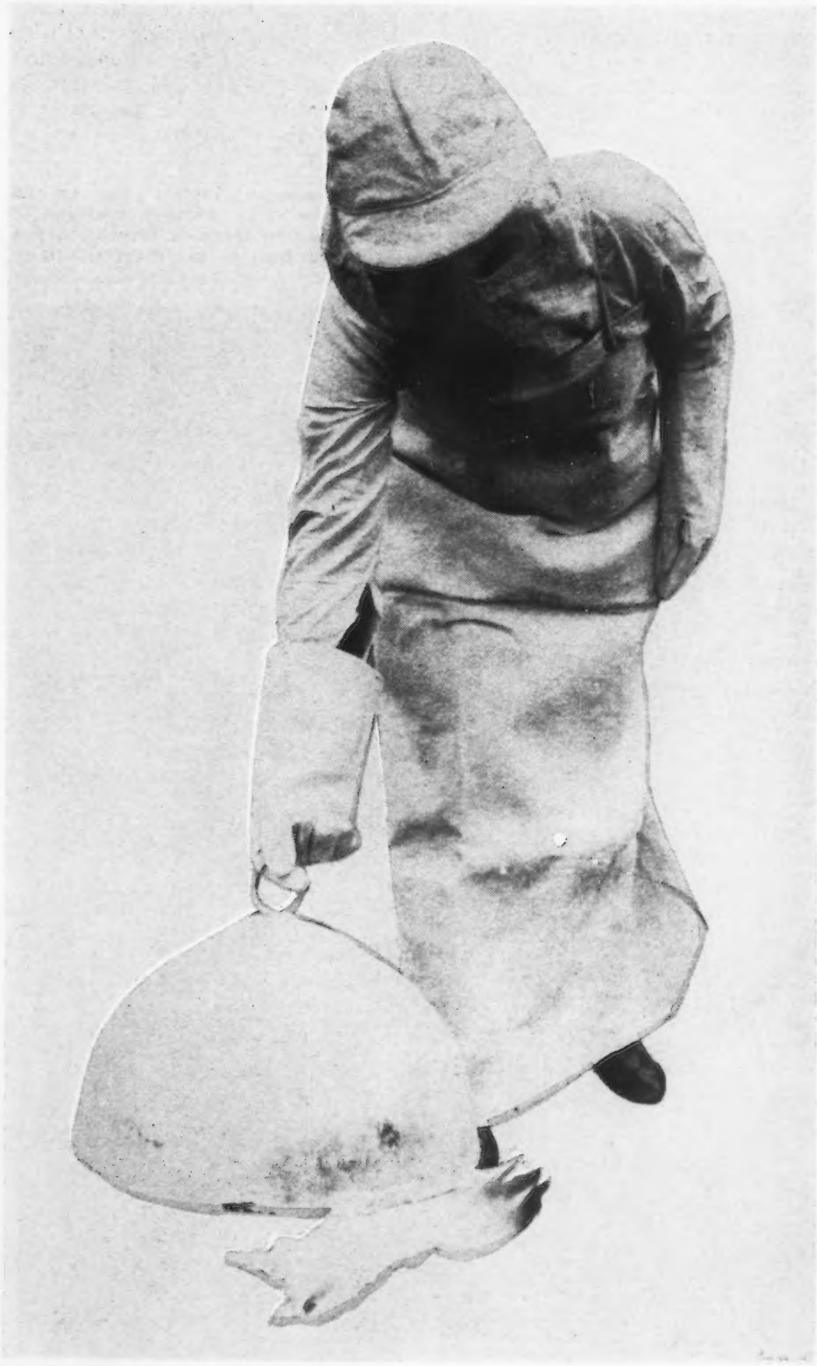


CAA Contracts May Get Preference Ratings

• • • **Orders and contracts** of the Civil Aeronautics Administration may hereafter be assigned preference ratings by the Priorities Committee of the Army and Navy Munitions Board, it was announced last week by E. R. Stettinius, Jr., OPM Director of Priorities.

FIRE BOMB FIGHTER: Asbestos gloves, apron and helmet, with an asbestos snuffer, complete this British fire bomb fighter's equipment. On April 19, enlistment of 500,000 civilians in a volunteer air-raid observers' corps was begun by Gen. George C. Marshall, U. S. Army chief of staff. The U. S. War Department soon will issue pamphlets on air-raid protection, blackouts, construction of bomb shelters.

Photo by British Combine



6 Wisconsin Companies Announce Plant Expansions

Milwaukee

• • • **Defense contracts** in Wisconsin have reached nearly $200,000,000. Nordberg Mfg. Co., Milwaukee, has received a torpedo tube contract from the Navy for $11,998,776, said to be the largest single Navy ordnance contract yet awarded in the state.

Plant facilities costing $2,301,000 are planed by six Wisconsin firms, five of them in Milwaukee county. The largest project given approval here is that of the Ladish Drop Forge Co., Cudahy, which will spend $1,417,000 on new production facilities. Other firms which are expanding include Globe Steel Tube Co., $120,000; the Heil Co., $371,000; the Kempsmith Machine Co., $49,000; David White Co., $11,000, all of Milwaukee, and the Leach Co., Oshkosh, $333,000.

Easterners Purchase Akron Machine Company

Akron, Ohio

• • • **An eastern group headed** by Maxim Kolmer, New York industrial engineer, has purchased the Akron Machine, Mold, Tool & Die Co.

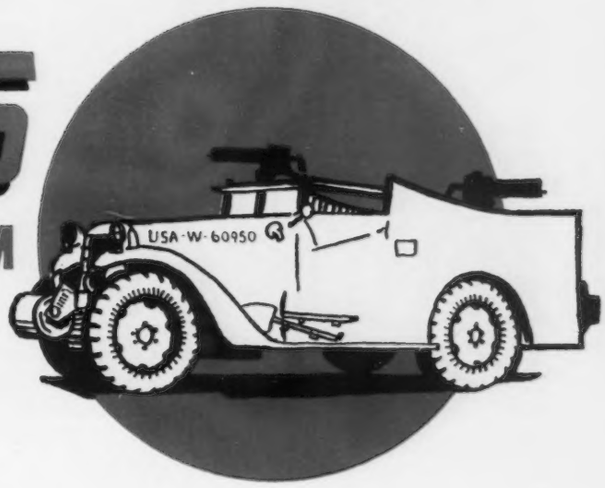
Expansion plans for an addition designed to house new machinery and equipment are being completed by the company, which recently moved into new quarters. Mr. Kolmer will act as vice president and treasurer of the company. M. H. Bernke, founder and president, has retired, while W. J. Moke, manager, and S. W. Hawkins, superintendent, will continue with the company.

LeTourneau Buys Avery Plant

Peoria, Ill.

• • • **R. G. Le Tourneau, Inc.,** has purchased the Avery Farm Machinery Co. plant, located adjacent to the Le Tourneau factory here. The sale includes all Avery buildings and equipment with the exception of two buildings previously sold. New quarters will house production lines for the manufacture of the Tournapull, and of the power control units which supply the power for all La Tourneau machines.

From COMMERCIAL RUCKS TO RUCKS FOR DEFENSE PROGRAM



The Transue deep drawn presses that only a short time ago were turning out oil pans for trucks to be used for a dozen diversified industries—are now pushing these same parts for trucks in the Defense Program.

Uncle Sam is our priority customer. We were one of the first plants to be called from our peace time production to help with the vital program of preparedness.

We are proud that Transue's skilled workmen and excellent facilities for producing precision products in pressed steel can do their part.

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TRANSUE & WILLIAMS

Bethlehem Orders Rise To $1.3 Billions

• • • **Although he did not** disclose whether or not he intended to seek adjustments of recently frozen steel prices, Eugene G. Grace, president of Bethlehem Steel Corp., in presenting the company's quarterly earnings statement, said it was his understanding that the purpose of the government was to effect a controlled and balanced economy and added that the company was entirely in sympathy with such a purpose. He said he recognized that many factors, including prices, labor and costs entered into the situation and that he hoped the end might be realized with fairness to all. "We will be hurt far less after the emergency if the government acts fairly," Mr. Grace said.

Net income of the company in the first quarter was reported at $10,436,028, as compared with $14,516,779 in the previous quarter, and $10,891,139 in the first quarter of 1940. Earnings are customarily lower in the first quarter due to the closing out of long-term contracts, the bulk of which are reflected in final quarter income. The heavier tax load this year was also clearly apparent. Income and excess profits taxes paid in the past quarter totaled $7,270,000, 155 per cent higher than the $2,855,000 paid in the first quarter of 1940. After deducting preferred dividends income was equal to $2.95 per common share, as against $4.32 in the preceding quarter, and $3.02 in the first quarter of last year. A dividend of $1.50 per common share was declared.

Unfilled orders rose to a new record high in the period, aggregating $1,323,200,000, a 10 per cent increase over the total of $1,204,100,000 held at Dec. 31, and comparing with $255,802,117 in the first quarter, 1940. Ratio of ship orders to regular steel bookings was approximately unchanged from year end at about 85 per cent of the total, or over $1 billion.

Currently operations are running at the rate of 102 per cent

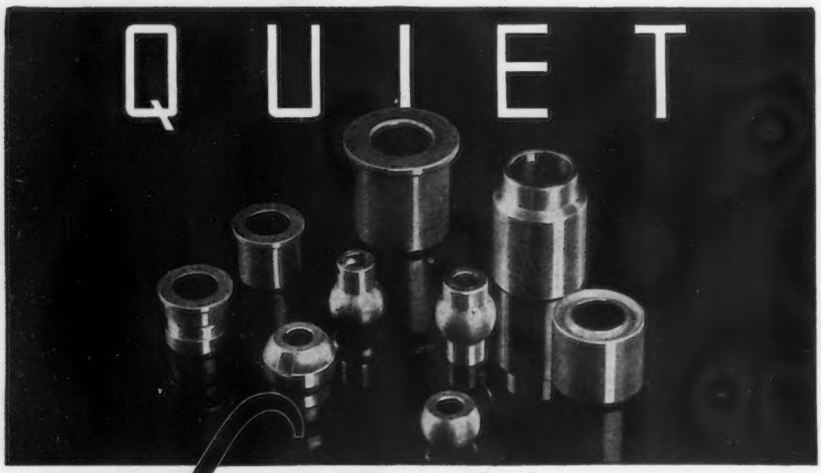
Downtown Cleveland Sees 0.50 Cal. Bullets Made

Cleveland

• • • **Armor - piercing steel machine gun bullets were being turned out at the rate of 10 a minute last week in front of the Cleveland Trust Co., Euclid Avenue at East 9th Street.**

Manufacture of the 0.50 caliber bullets was accomplished on an Acme-Gridley automatic, manufactured by the National Acme Co., Cleveland.

Seven simultaneous cutting operations are carried out. Bar stock steel is fed into one end of the five and a half-ton machine and the finished bullets drop into a bin at the front. The display is contained in a glass-enclosed room erected at the bank corner.



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Our exclusive process of PRE-ALLOYING the basic metals prevents the formation of harmful oxides . . . assures uniform structure throughout the bearing. Likewise, it permits the introduction of lead which provides quick, easy conformability and prevents galling or freezing to the shaft. Add to this the fact that LEDALOYL contains oil . . . up to 35% by volume . . . and you realize why LEDALOYL operates so *quietly*, so efficiently and for such a long period of time.

LEDALOYL is the only self-lubricating bearing with *controlled lubrication*. Millions of pores, evenly spaced, provide pin-point lubrication to the entire bearing area. The minute size of the pores *meters* the lubricant in the exact amount required for efficient operation at all speeds and loads. Likewise, the bearing absorbs the oil when the shaft is at rest. Thus you have the right amount of oil . . . in the right place . . . at the right time.

Why not try LEDALOYL on your next application. Test it in comparison to any bearing you have ever used. Compare the operating record . . . the operating temperature . . . the life and the load carrying capacity. Convince yourself that LEDALOYL is the ideal self-lubricating bearing. Your inquiry carries no obligation.

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LEDALOYL is now available from stocks conveniently located in principal industrial centers. Write for a copy of our latest catalogue listing sizes, prices and the location of your nearest source of supply

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET • NEW CASTLE, PA.

of capacity, the ninth consecutive month in which operations have equaled or exceeded 100 per cent. As yet the company has not been influenced by the coke shortage resulting from production stoppages in the soft coal industry, but will undoubtedly feel adverse effects if the present situation is not cleared up within a few weeks. "The production of steel is being seriously curtailed because of the lack of bituminous coal," Mr. Grace said.

The company's shipbuilding program is proceeding according to schedule, with expectations that the keel of the first of the "ugly ducklings" will be laid May 12, Mr. Grace said. He added that ship plate requirements were being adequately taken care of and that there is no important lack of steel in the shipbuilding program. It is possible, however, that sheet mills may be required to produce a greater proportion of plates in the future.

Proportion of foreign trade to total business was off in first quarter, orders dropping 10 per cent, and shipments about 6 per cent. Reservation of bottoms for cargoes considered by Great Britain to be of greater immediate importance is believed to be an important factor in the decline.

Mr. Grace reiterated his statement made at the end of 1940 that, with steel capacity about 3 to 4 times direct defense requirements, present capacity and that due to come in this year would be sufficient to meet all needs. Beyond the 870,000 tons of new capacity already planned for the current year, Bethlehem contemplates no further additions at the present time.

March Scrap Consumption Totals 4,662,000 Tons

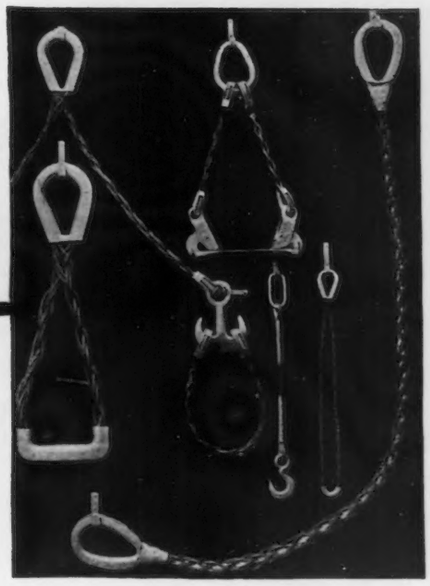
• • • **Steelworks and foundries** in the United States consumed 4,662,000 gross tons of iron and steel scrap in March, a record breaking total, the Institute of Scrap Iron and Steel, Inc., reports. This compared with 4,172,000 tons in February, and 2,728,000 tons in March, 1940. In the first quarter of 1941, domestic consumption was 13,112,000 tons contrasted with 9,121,000 tons in the corresponding period of 1940.

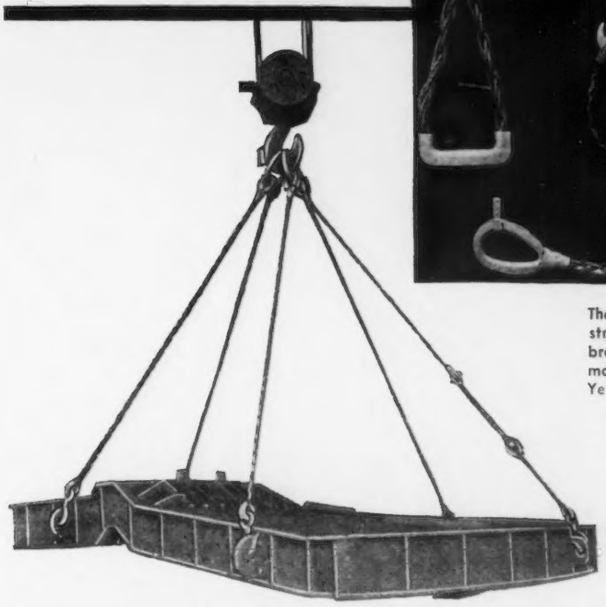
Shipbuilding Activity Gains On Great Lakes

Toledo, Ohio

• • • **The rise of shipbuilding** activity again on the Great Lakes is paced by construction work which is to be started on Coast Guard cutters and marine engines at Toledo. The keel for a million dollar Coast Guard cutter for active service in the Arctic patrol will be laid at the yards of the Toledo Shipbuilding Co. in July. This 200 ft. vessel will be the first government vessel constructed in Toledo since the World War when 36 cargo ships of 4000-ton size were launched at the rate of one each 28 days. The contract for six marine engines has been awarded to Toledo Shipbuilding Co. by the Maritime Commission. The engines will power cargo ships.

SLINGS for all sorts of LOADS





These and many other constructions and types of braided safety slings are now made exclusively of genuine Yellow Strand Rope.

Try Yellow Strand Plaited Safety Slings for handling "problem" loads in steel mill and foundry—irregular castings, steel rolls, huge transformers, etc. No shifting or slipping, no marring of highly finished steel—and no load too heavy—for these amazingly flexible, soft, kink-resistant and durable slings.

All plaited safety slings made under the original Murray Patents* are now manufactured by our company, exclusively, and only genuine Yellow Strand is used—the rope unsurpassed in quality and stamina.

Our engineering department is prepared to design a special Yellow Strand Plaited Safety Sling for any special problem.

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Yellow Strand Plaited Safety Slings

*Murray Patents: U.S. Patents 1475859, 1524671; Canadian Patents 252874, 258068.

FREE RIGGERS' HAND BOOK

Contains full data on Plaited Safety Slings, standard Yellow Strand Slings, fittings, etc. No charge, of course.

750 Pittsburgh Plants List Idle Machines

Pittsburgh

• • • **The emergency committee** of the Pittsburgh district and the Pittsburgh Commission for Industrial Expansion's recently completed survey of idle machine capacity available in the following 11 counties, Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Mercer, Washington, and Westmoreland, shows a tremendous reservoir of manufacturing facilities that are completely idle or operating on only a one-shift, five-day basis.

More than 750 manufacturers have registered their machinery and equipment with the commission in an effort to aid the OPM in its endeavor to farm out defense contracts to the smaller manufacturers.

More than 41,000 pieces of equipment and machinery were listed in this detailed survey which in many cases were completely idle or operating on only a one-shift, five-day basis. Some 22,500 machine tools were idle almost 16 hr. out of each 24. Such equipment as boring mills, gear cutters, grinders, keyseaters, engine lathes, turret lathes, milling machines, planers, punching and drill presses, shapers, welding machines, were among the 49 types of equipment listed that were idle from 16 to 24 hr. per day.

Many of these companies are equipped to make parts for shells, bombs, hand grenades, howitzer parts, crank shafts or propeller shafts and other items necessary for national defense.

As examples, the following equipment was found in one company that was idle from 10 to 24 hr. per day: 11 radial drilling machines, 2 multiple drill machines, 7 turret lathes, 4 engine lathes, 3 vertical turret lathes, 2 horizontal boring mills, 4 vertical boring mills, 1 keyseater, 2 shapers, 1 threader, 1 gear cutter, 1 grinder, 2 planers. The equipment in this plant is all in good shape.

Of particular importance to prime contractors desiring to sublet work is the fact that the following types and quantities of equipment are available in the Pittsburgh district: 380 bending machines, 413 boring mills, 15

CIO Strike Threat Ends In Sightseeing Bus Tour

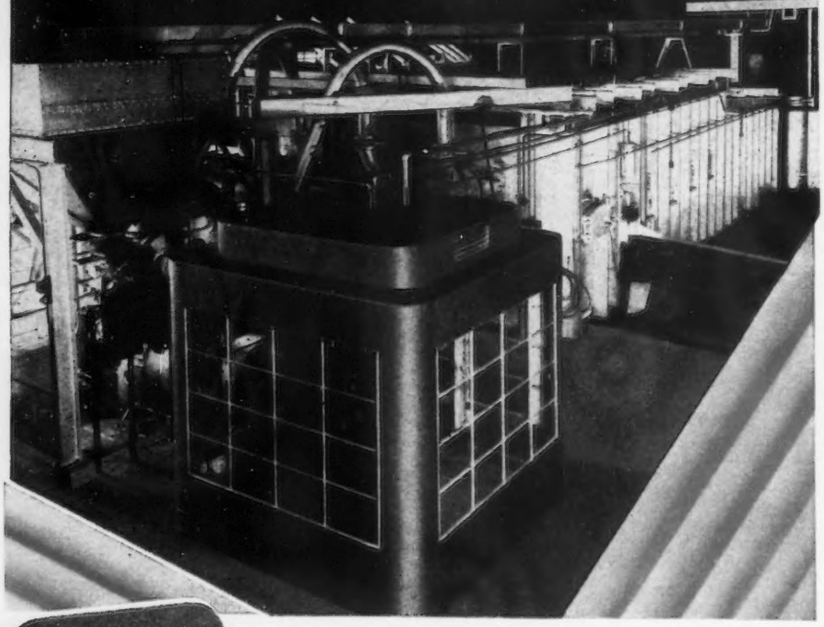
• • • This week the National Defense Mediation Board had settled its first "pre-strike" case, in which the United Electrical, Radio & Machine Workers (CIO) had threatened to stop work at two Minneapolis Moline Power Equipment Co. plants in Minneapolis and Hopkins, Minn.

In its statement telling how the company and the union finally ended their differences, the Defense Board concluded:

"They then chartered a sightseeing bus and all the company and union negotiators went off together for a 3-hr. tour of Washington."

AMCO OFFERS ANOTHER ADVANCEMENT··

IN THE ART OF HEATING STEEL



CONTINUOUS HEATING FURNACES
AMCO PIT FURNACES
ROTARY HEARTH FURNACES
FORGING AND ANNEALING FURNACES
PULVERIZED COAL SYSTEMS

This Continuous Heating Furnace, fired with Pulverized Coal, fully automatically controlled, is another AMCO achievement for the heating of steel!

Other furnace units involving the application of AMCO Pulverized Coal Systems are now under contract as part of the National Defense Program.

5

The AMSLER-MORTON COMPANY
FULTON BUILDING • PITTSBURGH, PA.

Government Publishes Booklet on Priorities

• • • The Division of Priorities, Office of Production Management, Washington, has published a booklet entitled "Priorities and Defense" which gives full instructions to manufacturers and others on how priorities or preference ratings may be obtained and how they should be used. The booklet contains full information on methods of obtaining priorities and preference ratings and contains reproductions of the various forms used by the Priorities Division. Copies of the booklet may be obtained from the Information Division, Office for Emergency Management, Washington.

broaching tools, 733 cut-off tools, 970 radial and multiple drills, 340 forging hammers, 100 gear cutters, 1500 grinders, 66 keyseaters, 2238 engine lathes, 516 turret lathes, 287 automatic screw machines, 915 milling machines, 308 planers, 3297 presses, 576 threaders, 1037 welding machines, and 7104 textile machines.

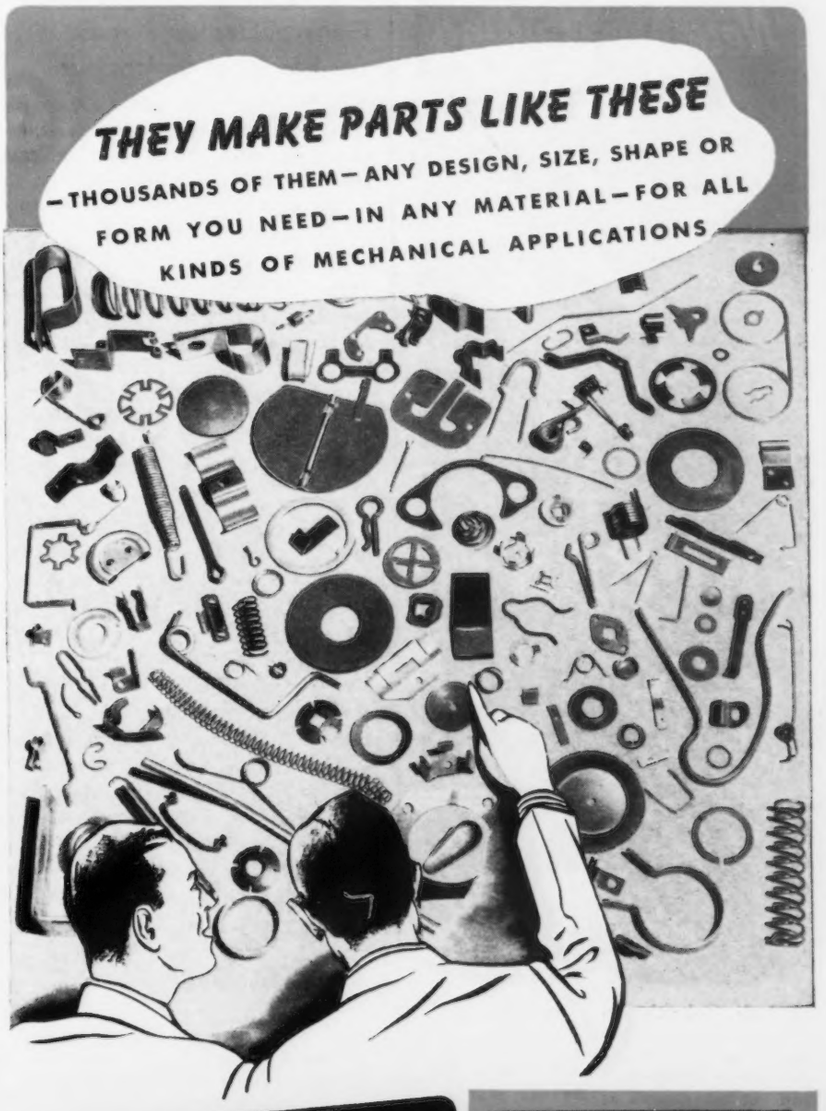
Commenting on the survey, C. E. Robinson, manager, Pittsburgh Commission for Industrial Expansion, said "Dissemination of this information to the prime contractors throughout the United States has brought over 56 inquiries which amount to well over $40,000,000. These inquiries range from thread ring gages to propeller shafts and diesel engine parts.

"To date contracts have successfully been negotiated with five manufacturers in four counties totalling over $200,000. One large manufacturer who is still seeking subcontractors, has to date placed orders with several local manufacturers that will take their entire output for the next two years. I estimate that this latter company will place over $10,000,000 worth of subcontract work in the Pittsburgh area."

Spain Restricts Use of Iron

London

• • • **Substantial** restrictions on the use of iron for building purposes were decided upon at a recent meeting of the Spanish Cabinet.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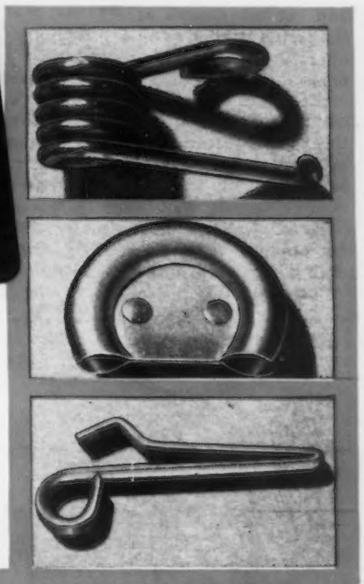

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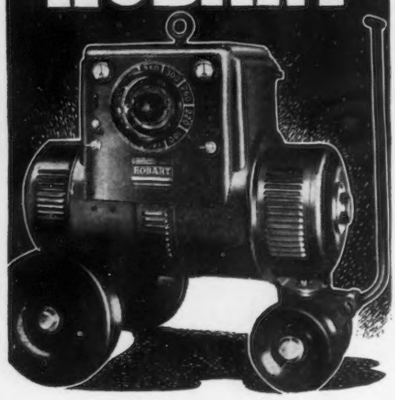
New Arc Welding *Speed* for Defense

HOBART



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"One of the World's Largest Builders of Electric Arc Welders"

General Electric Pleads For More Subcontractors

• • • **General Electric Co.,** which has already increased its list of defense subcontractors to more than 350, has made a plea for additional subcontractors to speed the defense program.

While General Electric has built many new factories, has increased working hours and is using much of its manpower and manufacturing facilities on defense projects, more subcontracting is needed to expedite deliveries, C. E. Wilson, president, said. Types of work G-E is anxious to subcontract includes:

Designing and making tools, dies, jigs, fixtures; making screw machine parts, metal stampings, wood and metal patterns, forgings, castings (cast iron, steel, aluminum and other non-ferrous metals) and gears of all sizes and types.

"We also have miscellaneous machine work such as shaft turning, horizontal and vertical boring, planing, broaching, milling, grinding, drilling and tapping; electroplating; medium and heavy steel metal fabricating by the arc, atomic hydrogen or resistance welding process; and sub-assembly work," Mr. Wilson said. (Prospective subcontractors may address letters to the Purchasing Department, Room 133 General Electric Co., Schenectady, N. Y.)

New Housing Planned At Many Industrial Towns

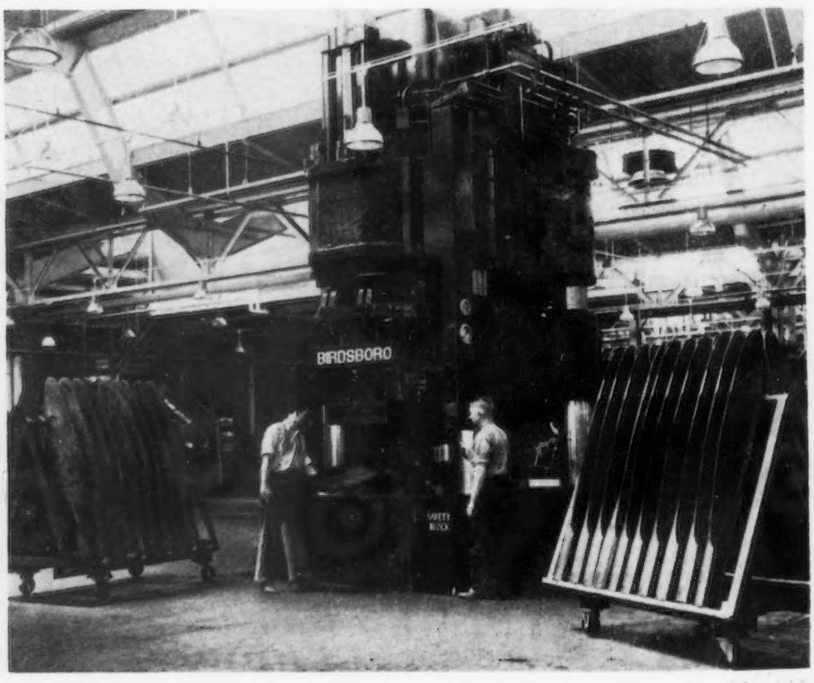
Washington

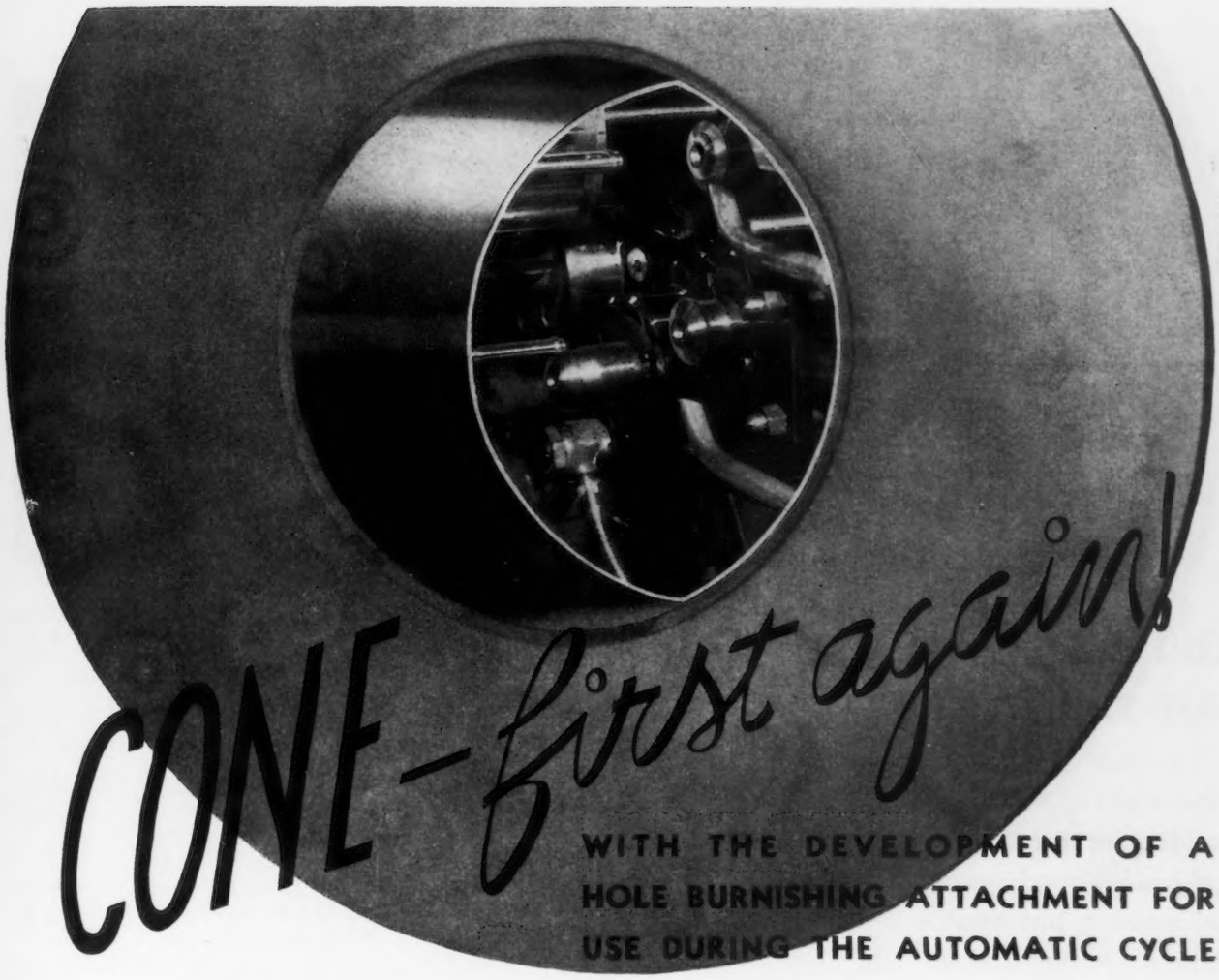
• • • **Out of 2580 new dwelling** units, whose construction was contracted for during the week ended April 12 under the coordinated defense housing program, 1030 units will be built for civilian defense workers in Philadelphia and Erie, Pa.

Other areas given contracts for civilian workers included Ellwood City, Pa., 100 units; Birmingham, Ala., 300 units; Pedricktown, N. J., 100 units; Ravenna-Warren, Ohio, 200 units. For the families of enlisted personnel, contracts were awarded for the construction of 262 units at Quonset Point, R. I.; 500 units at Corpus Christi, Tex.; and 88 units at Fort Buchanan, San Juan Porto Rico.

Total defense construction now under way includes 48,487 units in 136 localities in 47 states.

NEW PROPELLER PLANT: Built for making propeller blades, a new 2000-ton hydraulic press has been installed at Curtiss-Wright's new propeller plant at Caldwell, N. J. *Photo by WideWorld*





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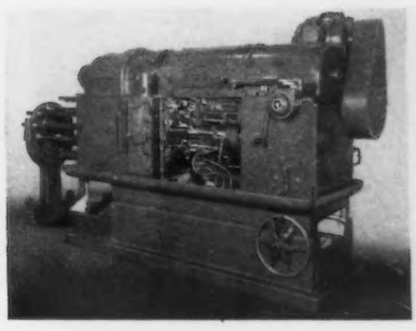
WITH THE DEVELOPMENT OF A HOLE BURNISHING ATTACHMENT FOR USE DURING THE AUTOMATIC CYCLE

Here is *another* CONE FIRST that offers new facilities for stepping up multiple-spindle production on present and future work.

Now holes may be burnished in gear blanks and similar parts during the automatic cycle of your Conomatics. Just think what this new Cone development means in dollars and cents savings—*no rehandling; no grinding; no loss of floor space, labor or motion!*

Now is the time for SPEED and more SPEED—SPEED spells security. Now is the time to purchase wisely. Cone is always ready with a complete line of Conomatics and attachments which insure more SPEED and ECONOMY.



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and STAY OUT!

SAID THE PUR. AGT.:

"I've had my last 'spring headache'! Ever since I listened to that guy's low-price-and-just-as-good yarn, I've had nothing but trouble, rejections, replacements, lost time and lost production on account of inferior springs.

"I'm through with cheap springs . . . me for Cuyahoga Springs! They are an investment in accuracy, long life, quality material, dependable performance, and peace of mind."

COIL SPRINGS OF ALL KINDS
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Photo by WideWorld

MEDAL TO BATT: William L. Batt (center), president of SKF Industries and deputy director of the OPM's production division is shown receiving the Gannt medal from L. P. Alford (left), chairman, American Society of Mechanical Engineers, at the Engineers Club at Philadelphia. Looking on is George Elliot, of the Philadelphia Chamber of Commerce.

Engineering Education Trends Discussed in Two Reports

• • • **Prepared at Carnegie** Tech, the present quarterly issue of the Journal of Phi Kappa Phi, honor society, coordinates for the first time in publication form the objectives of engineering education recently approved by the Engineers' Council for Professional Development and the Society for the Promotion of Engineering Education. Professor Lawrence R. Guild, head of Carnegie Tech's department of management engineering, is national secretary of Phi Kappa Phi.

Accrediting procedure for engineering schools and a list of accredited curricula in 125 engineering schools in the United States are to be found in the eight annual report of the Engineer's Council for Professional Development, 29 West 39th Street, New York. Further progress in the application of aptitude tests used in the selection of high school boys for engineering careers is reported. Reports on professional recognition and professional ethics are also included.

Founded in 1932, E.C.P.D. is an organization representing the American Society of Civil Engineers, American Institute of Mining & Metallurgical Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Institute of Chemical Engineers, Society for the Promotion of Engineering Education, National Council of State Boards of Engineering Examiners, and the Engineering Institute of Canada.

Industry Told To Seek Deferment for Skilled Men

Chicago

• • • **It is not unpatriotic** for employers to ask occupational deferment for necessary employees of selective service age, Paul G. Armstrong, Illinois State Director of Selective Service, says in a letter sent to Illinois firms.

Production of armaments is so necessary, Armstrong pointed out, that plants who may not have defense orders now but who are capable of handling them in the future, should consider their draft eligible employees with that in mind. Employee deferments should be sought early and not withheld until the selectee has received notice to report to the army. "We do not want to take men from industry or civilian life who are needed in their present jobs for the national health, safety and interest. Industry must be particularly careful not to deplete the production machinery of the country."

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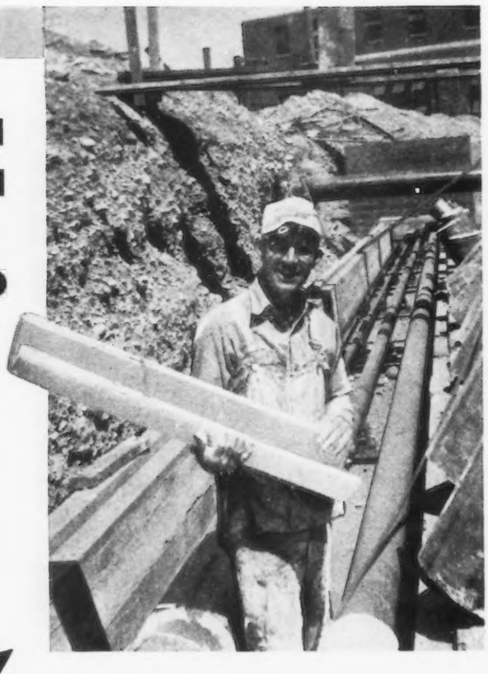
WHEN STEAM DISTRIBUTION GOES UNDERGROUND



Carey MAGNESIA • ASBESTOS HEAT INSULATIONS Do the Job RIGHT

The defense program with its industrial expansion—new airports—cantonment construction—community housing, and other building activities is accelerating demand for underground transportation of steam. The paramount problem is one of efficiency; and this pre-eminently is a matter of correct insulation.

Since the early days of underground steam distribution, CAREY has cooperated with industry to meet this problem more economically. New and superior insulations have been developed that drastically reduce heat losses and greatly widen the practical field of distribution.

CAREY Insulations meet every service condition from sub-zero to 2500°F. Whatever your problem, put it up to CAREY for permanent satisfaction. Write for Insulation Catalog—address Dept. 26.

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Dependable Products Since 1873
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OPM Studies Zinc Supply, May Alter Methods of Controls

Washington

• • • **Possibilities** of increasing the size of the pool, of a general priorities system and of other changes in the present controls will be considered in a new examination of the supply situation in zinc by the OPM Minerals and Metals group of the Priorities Division. In announcing the study, OPM Director of Priorities E. R. Stettinius, Jr., said the decision to explore all aspects of the situation was made following a meeting between members of the Minerals and Metals group and representatives of the zinc industry. At the meeting the present supply and demand picture in zinc was reviewed, with special emphasis on the continuing demands which may be imposed for national defense purposes.

The possibility of changes in the present method of control was among the matters discussed. Each producer of slab zinc is now required to set aside, for May, an amount of zinc equal to 17 per cent of March production.

It was stated that the demand for zinc for all purposes, including defense and civilian, is now running ahead of production.

Learner Lesson Sheets Issued by Atas Press Co.

• • • **A series of large size** blueprinted lesson sheets containing material for related classroom instruction of apprentices and learners in metal working shops has been prepared by the Atlas Press Co., Kalamazoo, Mich. One sheet contains data on tool bit design for various types of turning and facing operations, also data on cutting angles, surface speeds and type of coolant to use in machining various materials. A second sheet illustrates various thread forms and threading cutting terms. The third and last sheet gives tables covering 60-deg. V-type thread dimensions for National coarse, fine and special thread series, as well as metric sizes and numbered drill diameters.

Photo by Harris & Ewing

ALL IS HARMONY: OPM Associate Director Sidney Hillman, in an appearance last week before the Senate Committee investigating defense strikes, declared that such strikes are decreasing. He said that a new "harmonious" understanding now exists between management and labor.

United Kingdom's Steel Mills Continue at Peak

London

• • • **Steel mills throughout** the United Kingdom continue to be operating at around peak activity. Requirements of the shipbuilding industry are expanding sharply as a result of the heavy program arranged for the next few months, and this covers plates and sheets as well as lighter products.

The lighter qualities of steel sections are being produced in growing quantities at back country rerolling mills. The market for galvanized sheets is expanding, much tonnage being needed for work of national importance. The position regarding semi-finished material for rerolling continues satisfactory. Cargoes of billets and sheet bars arrive steadily from overseas mills, enabling British rerollers to maintain a high rate of output.

It's Good Economy and Good Cooperation with the National Defense Program to Build Stainless Equipment of

INGACLAD

STAINLESS-CLAD STEEL

In many types of Stainless Equipment, IngAclad makes Stainless Steel go *5 times* as far.

Its use is proving to be the happy solution for both equipment buyers and their fabricators.

First, because it offers real economies while giving perfect stainless protection on the side that is used, and . . .

Second, because it enables you to cooperate with the National Defense Program in the conservation of Stainless Steel.

Write for special IngAclad Folder. Fabricators are invited to send for the New Manual of "Welding and Fabricating Procedures" with IngAclad.

INGERSOLL

STEEL & DISC DIVISION

BORG-WARNER CORPORATION

310 South Michigan Avenue, Chicago, Illinois

Unretouched photo of machine-cutting. Note the inseparable bond.

1

The same amount of Solid Stainless when used in the form of IngAclad makes 5 Sheets or Plates of the same size and gauge.

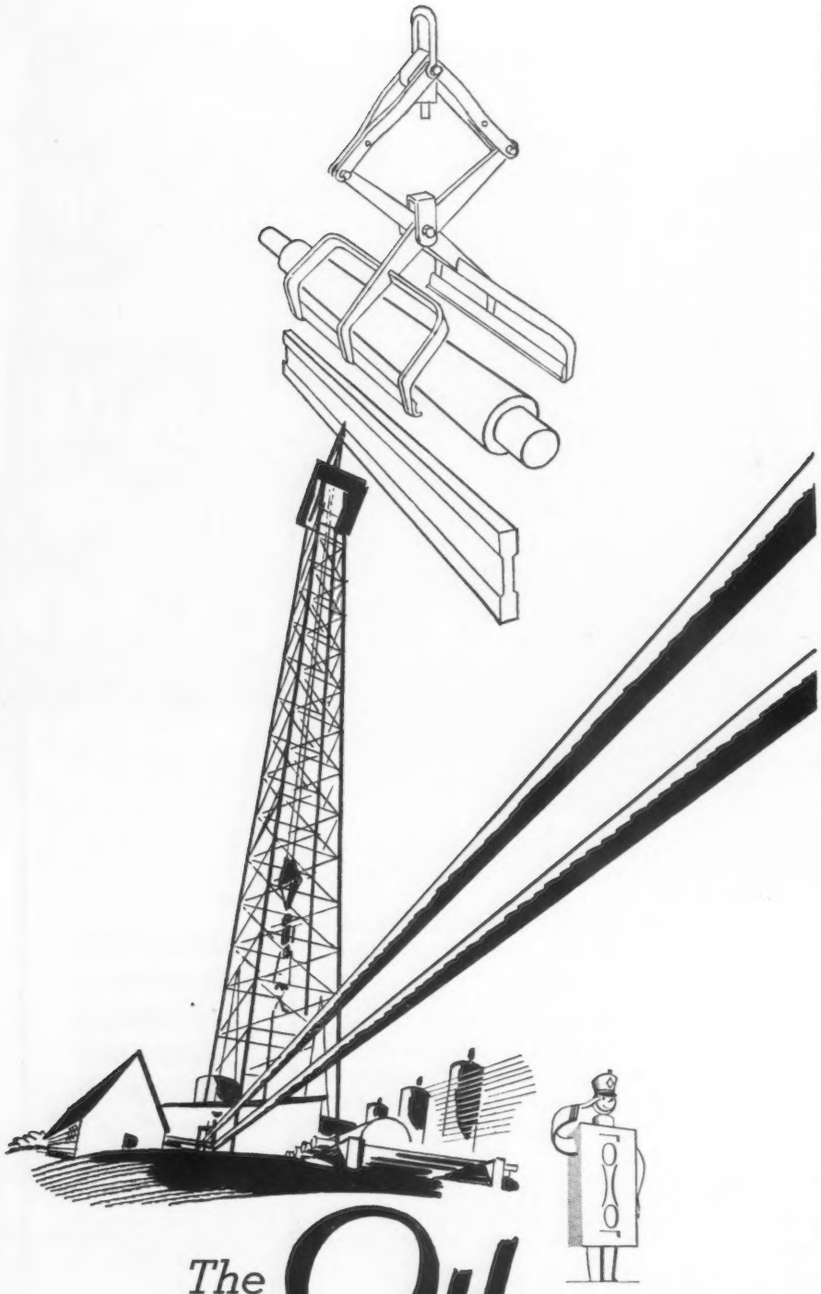
5

Users of INGACLAD Include:

American Cyanamid Co.
R. D. Cole Mfg. Co., Newnan, Ga.
Dow Chemical Co.
E. I. DuPont de Nemours Co.
Greenville Steel & Foundry Co., Greenville, So. Car.
Graver Tank & Mfg. Co. Inc., E. Chicago, Ind.
Hercules Powder Co.
Holliston Mills, Kingsport, Tenn.
Jeffrey Mfg. Co., Columbus, O.
Leader Iron Works, Decatur, Ill.
Monsanto Chemical Co.
Sayles Finishing Plants, Inc.
Sheet Metal Engineering Co., Chicago.
Southern Bleachery & Print Works, Taylors, So. Car.
Stevens Metal Products Co., Niles, Ohio.

INGACLAD

STAINLESS-CLAD STEEL



The OIL Industry

. . . with the exception of drill collars, is not a direct customer of Heppenstall. Nevertheless, the Oil Industry does use many products which are made with Heppenstall products; such as die blocks for forging parts and products, shear knives for cutting steel, "tailor-made" forgings, pinions and many other forged products.

Heppenstall

PITTSBURGH · DETROIT · BRIDGEPORT

Government Awards

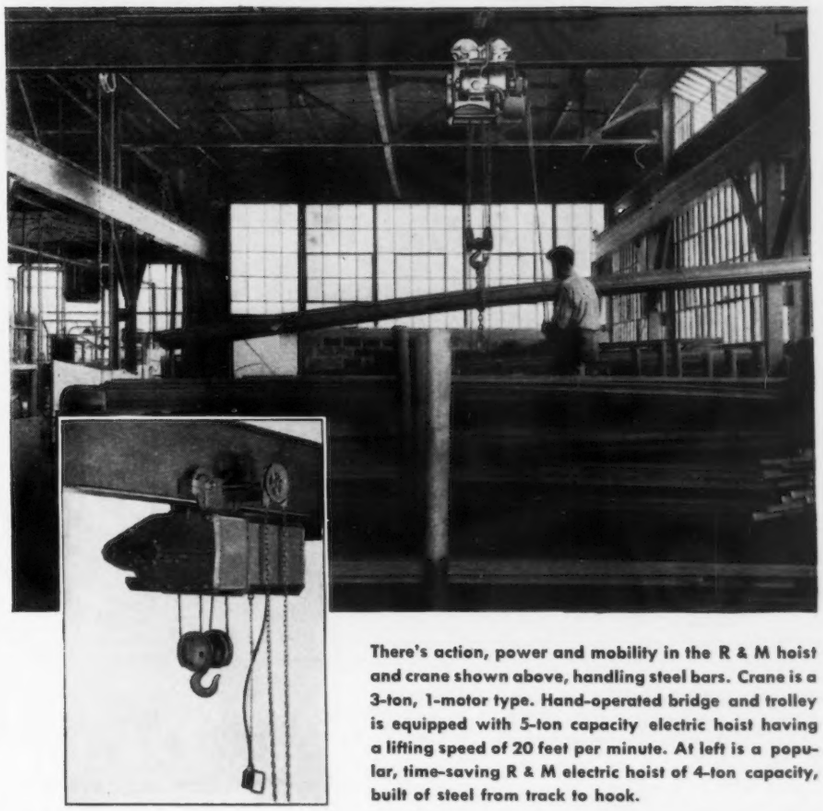
Navy Dept., Bureau of Supplies and Accounts:

Air Reduction Sales Co., New York; acetylene, in cylinders .. $174,029
Apollo Steel Co., Apollo, Pa.; steel, flat sheet 84,444
American Brass Co., Waterbury, Conn.; facings, boat, half oval, brass, naval 28,840
tubing, copper-nickel alloy 8,788
American-LaFrance Foamite Corp., Elmira, N. Y.; extinguishers, fire 18,678
American Mason Safety Tread Co., Lowell, Mass.; treads, safety, type A, brass base 53,100
American Steel & Wire Co., Washington; cable, electric, insulated 5,743
cable, copper, electric 12,227
Anaconda Wire & Cable Co., New York; cable 59,093
Atlas Car & Mfg. Co., Cleveland; trucks, industrial, electric 11,324
Babcock & Wilcox Tube Co., Beaver Falls, Pa.; tubes, boiler, class B, chromium-molybdenum steel 39,410
Baldwin-Southwark Div., Baldwin Locomotive Works, Philadelphia; machines, plate edge, planing, motor driven 105,500
Barber-Coleman Co., Rockford, Ill.; machines, gear hobbing, motor driven 9,896
Bendix Aviation Corp., Marine Div., Brooklyn; equipment, salinity indicating 22,897
L. A. Benson Co., Inc., Baltimore; countersinks and reamers, carbon and high speed steel 16,846
Brown & Sharpe Mfg. Co., Providence; machine, grinding, universal, tool and cutter, motor driven 5,139
machines, milling, motor driven 77,459
Browning Crane & Shovel Co., Cleveland; 11 locomotive cranes 326,368
Edward G. Budd Mfg. Co., Philadelphia; inner smoke pipe 590,612
Bullard Co., Bridgeport, Conn.; lathes, turret, vertical, motor driven 25,316
Carnegie-Illinois Steel Corp., Washington; steel, sheet 36,520
Caswell Strauss & Co., Inc., New York; tin, pig, grade A 291,200
Chase Brass & Copper Co., Inc., Waterbury, Conn.; tubing, copper-nickel alloy 9,122
Chelsea Clock Co., Chelsea, Mass.; clocks, deck 35,700
Clyde Iron Works, Inc., Duluth; winches, steam driven, double drum and spare parts 10,540
Collyer Insulated Wire Co., Pawtucket, R. I.; cable, electric insulated 14,596
County Supply Co., Plainfield, N. J.; bars, anvils, flatters and fullers, blacksmith's 5,914
Dana Tool-D Nast Machinery Co., Philadelphia; vises, machinists' bench swivel base 5,763
DeLaval Steam Turbine Co., Trenton, N. J.; pumps, motor driven, spare parts, tools and wrenches 461,950
Diagraph Bradley Stencil Machine Corp., St. Louis; machines, stencil cutting 12,650
Edo Aircraft Corp., College Point, N. Y.; additional aircraft parts plant facilities 43,326
Electro Metallurgical Sales Corp., New York; ferromanganese ... 27,320
Electrol, Inc., Kingston, N. Y.; additional aircraft parts plant facilities 393,462
Fairchild Aviation Corp., Jamaica, N. Y.; aircraft cameras 69,300
General Cable Corp., Washington; cable, electric, insulated, arc-welding 10,564

AWARDS

General Electric Co., Schenectady; cable, electric, insulated 5,788
Gleason Works, Rochester; generators, bevel gear, motor driven. 11,321
Graybar Electric Co., Inc., Washington; shackles, various 16,464
Grimes Mfg. Co., Urbana, Ohio; lights, signal, complete 20,067
Hardie Tynes Mfg. Co., Birmingham; compressors, air, high pressure 220,120
Harnischfeger Corp., Milwaukee; 20-ton bridge crane 18,565
Hooven, Owens, Rentschler Co., Hamilton, Ohio; head, lower cylinder, complete 5,634
Hudson Air Conditioning Corp., Washington; conditioners, air .. 19,729
Hughes-Keenan Co., Mansfield, Ohio; cranes, gasoline 11,478
Ingersoll-Rand Co., Washington; air compressors 469,174
Intertype Corp., Brooklyn; machines, typesetting 10,321
Jones & Lamson Machine Co., Springfield, Vt.; machine, grinder, thread, set of equipment .. 23,014
Lees-Bradner Co., Cleveland; machines, thread milling, heavy duty 17,299
Lodge & Shipley Machine Tool Co., Cincinnati; lathes, engine; tools and equipment 14,979
Louden Machinery Co., Philadelphia; monorail traveling cranes 14,254
Maine Steel, Inc., S. Portland, Me.; shackles, various 24,798
Matthews Co., Port Clinton, Ohio; launches, motor 65,150
Mercer Tube & Mfg. Co., Sharon, Pa.; pipe, steel, welded or seamless 206,494
Mergenthaler Linotype Co., Brooklyn; machines, typesetting 10,195
Murphy Elevator Co., Louisville, Ky.; elevators 52,433
National Electric Products Corp., Pittsburgh; cable, electric, insulated 5,720
Nicholson File Co., Providence; files, various, rasps, wood 150,404
Okonite Co., Passaic, N. J.; cable 46,784
Orton Crane & Shovel Co., Chicago; nine locomotive cranes .. 199,123
Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire Div., New York; cable, electric, insulated 5,940
Pittsburgh Steel Co., Pittsburgh; tubes, boiler, seamless 43,821
tubes, boiler, carbon steel 27,376
Pollack Mfg. Co., Arlington, N. J.; ordnance equipment 1,156,932
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford; machines, radial, drilling and tapping 22,648
lathes, bench, precision type .. 16,295
Providence Mill Supply Co., Providence; vises, machinist bench swivel base, and combination bench and pipe 73,558
Republic Steel Corp., Massillon, Ohio; steel, sheet 28,234
Revere Copper & Brass, Inc., Baltimore; tubes, condenser, copper-nickel alloy 148,519
copper, strip, type F 10,550
Rockbestos Products Corp., New Haven, Conn.; cable, electric, insulated 6,033
Rockford Machine Tool Co., Rockford, Ill.; shaper-planer, hydraulic 12,869
Shaw-Box Crane & Hoist Div., Muskegon, Mich.; 50-ton crane. 32,336
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.; 12 bridge cranes 90,861
Sperry Gyroscope Co., Inc., Brooklyn; equipment, auxiliary 5,025
Star Iron & Steel Co., Tacoma, Wash.; 50-ton dry dock crane .. 212,500
Fred W. Steffgen, San Diego, Cal.; steel sheet pile protection 29,300

"Take it up" WITH R & M



There's action, power and mobility in the R & M hoist and crane shown above, handling steel bars. Crane is a 3-ton, 1-motor type. Hand-operated bridge and trolley is equipped with 5-ton capacity electric hoist having a lifting speed of 20 feet per minute. At left is a popular, time-saving R & M electric hoist of 4-ton capacity, built of steel from track to hook.

"TAKE it up" with R & M has become the economy byword in hoists and cranes for all types of industries. Here's one of many actual case records, for instance:

Production had to be stepped up in a leading midwestern machine-manufacturing plant. More skilled help was added . . . more equipment installed. Still, output lagged.

An R & M expert, working with the plant engineer, spotted the trouble. Old-type chain hoists were sapping man-efficiency, log-jamming heavy castings and steel bars all along the line. Three R & M hoists were installed . . . and here's what the cost chart shows:

- **R & M hoists are handling material 80% faster.**
- **Man-efficiency has shown a decided increase due to less muscle strain and fatigue from chain-hoist lifting.**
- **Not one dime has been spent for maintenance or repairs . . . not one minute lost in service since the hoists were installed.**
- **The R & M hoists paid for themselves within six months in savings made and in increased output.**

R & M has a *profitable* solution for your hoist and crane problem. Two thousand standard types are offered, from ¼-ton bantams to 10-ton huskies. And if none of these fits the job, we'll build one that *does*.

Phone the nearest R & M sales and service office listed in your classified telephone directory. Or write factory direct for further details. It will pay you to "take it up" with R & M.

ROBBINS & MYERS, Inc.
HOIST & CRANE DIVISION • SPRINGFIELD, OHIO
MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

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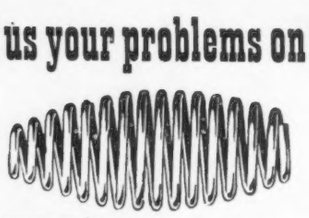
Send us your problems on Compression Springs



"We don't know all about springs
BUT
All we do know is about springs"

We may suggest:

* An open end where space is limited.
* Closed ends to avoid tangling and speed up assembly time.
* Ground ends where necessary to stand squarely and compress uniformly.
* Removing set if highly stressed when at work.
* Allowing for set if compressed solid when assembling.
* Kind of material and finish.

Tell us the working length, with load spring is to carry at given length. Better still, send us the part in which the spring goes.

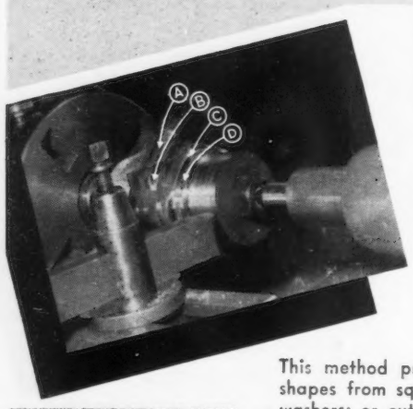
Dunbar Bros. Co.

DIVISION OF ASSOCIATED SPRING CORPORATION

BRISTOL, CONNECTICUT

"Quality Springs Since 1845"

MAKING ROUND STEEL PARTS?



Tool steel blanks are superior when cut from SQUARE stock. Do it economically with KENNAMETAL.

The illustration shows a stack of 16 tool steel washers being turned round with a KENNAMETAL Style No. 3 steel-cutting tool at Greenlee Bros. & Co., Rockford, Ill. The washers were first sawed off square in stacks, a center hole was then drilled through, and finally the stack was turned round as shown.

This method proved more economical than blanking round shapes from square stock, which distorted the shape of the washers; or cutting off washers from round stock, which produced variation in thicknesses. In each case, excessive surface grinding was necessary; whereas sawing square blanks, then turning round with KENNAMETAL, resulted in even, true-running washers that required no surface grinding. Square forged tool steel has the structure preferred by metallurgists.

This method for making washers proved practical largely because of the high cutting speed (335 ft. per min.) made possible with the KENNAMETAL tool; and because KENNAMETAL was able to stand up under the 1359 interrupted cuts per load of blanks, caused by the square corners banging into the tool. The first three cuts for turning off the corners were stopped at points A, B, and C respectively to show the severity of these interruptions.

THE RELIABLE TOOL CARBIDE

You pay less, and get faster deliveries by ordering STANDARD Kennametal tools. Write for new Catalog No. 41, containing specifications and prices.

McKENNA METALS Co.
144 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

Sullivan Machinery Co., Michigan City, Ind.; compressors, air, low pressure	21,497
Taylor-Parker Co., Inc., Norfolk, Va.; countersinks and reamers, carbon steel	12,831
Titeflex Metal Hose Co., Newark; additional aircraft parts plant facilities	375,000
United Aircraft Corp., Vought-Sikorsky Aircraft Div., Stratford, Conn.; additional aircraft parts plant facilities	365,918
U. S. Tool Co., Inc., Ampere, N. J.; machines, milling, plain, horizontal, motor driven	11,310
Walworth Co., New York; valves, steel, welded and springs, spares	366,024
fittings, tube and flanges, pipe	1,500,000
Woodward Wight & Co., Ltd., New Orleans; countersinks and reamers, carbon and high speed steel	24,191
Wooster Products, Inc., Wooster, Ohio; treads, safety, type B, aluminum alloy base, abrasive insertion	18,450
Worthington Pump & Machinery Co., Washington; pumps, centrifugal type	25,270
compressors, air	326,291
additional aircraft parts plant facilities	129,700

War Dept. Ordnance:

Allis-Chalmers Mfg. Co., Springfield, Ill.; heavy tractors	86,133
American Brass Co., Waterbury, Conn.; brass, strip	40,214
B. C. Ames Co., Waltham, Mass.; gages	6,235
Austin-Hastings Co., Inc., Cambridge, Mass.; lathes, precision	9,444
Automatic Machine Products Co., Attleboro, Mass.; bodies for primer	17,520
Bay State Tool & Machine Co., Springfield, Mass.; shears	10,756
Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; parts for light tanks	7,063
Benrus Watch Co., Waterbury, Conn.; gears	22,500
Brass Goods Mfg. Co., Brooklyn; gilding metal	135,965
Breeze Corporation, Inc., Newark; starters	5,440
Buda Co., Harvey, Ill.; parts for diesel engines	6,481
Bulova Watch Co., New York; escape pinions	6,480
Burgess-Norton Mfg. Co., Geneva, Ill.; bodies	8,820
Cincinnati Milling Machine & Grinders, Inc., Cincinnati; grinders	7,667
Cohn & Rosenberger, Inc., Providence; cups, booster closing	15,471
Colt's Patent Fire Arms Mfg. Co., Small Arms Div., Hartford; small arms materiel	120,653
Continental Motors Corp., Detroit; medium tank parts	30,145
Cowles Tool Co., Cleveland; tools	14,035
Crucible Steel Co. of America, Pittsburgh; steel tubing	24,874
Derbyshire Machine & Tool Co., Philadelphia; dies	39,420
Donaldson Co., Inc., St. Paul, Minn.; air cleaners	5,283
Ex-Cell-O Corp., Continental Tool Works Div., Detroit; cutting tools	11,313
Fox Munitions Corp., Philadelphia; gages	19,524
Geometric Tool Co., New Haven; chasers	5,410
Gould-Mersereau Co., Inc., Long Island City, N. Y.; head assys.	115,462
Guiberson Diesel Engine Co., Dallas; parts for light tanks	33,079
Hanson-Whitney Machine Co., Hartford; gages	8,768
Hartford Electric Steel Corp., Roxbury, Mass.; steel castings	10,137
International Nickel Co., Inc., Huntington, W. Va.; forgings	6,190

Jones & Laughlin Steel Co., Pittsburgh; steel, cold drawn 21,997
Karp Metal Products Co., Inc., Brooklyn; boxes, tool 31,796
Kingsburgy Machine Tool Co., Keene, N. H.; machines, automatic indexing station 11,162
Landis Machine Co., Inc., Waynesboro, Pa.; chasers, high speed.. 22,040
Lapointe Machine Tool Co., Hudson, Mass.; broaching equipment 18,026
LaSalle Steel Co., Hammond, Ind.; steel 6,527
Lincoln Park Tool & Gage Co., Lincoln Park, Mich.; gages ... 15,482
Lowell Wrench Co., Worcester, Mass.; reversible wrenches 38,600
Madison-Kipp Corp., Madison, Wis.; die castings 15,780
McKenna Metals Co., Latrobe, Pa.; tools 11,630
Moore Special Tool Co., Inc., Bridgeport; tools 21,295
Niles-Bement-Pond Co., Pratt & Whitney Div., Hartford; cutters 6,524
Norco Metal Products Co., Philadelphia; punches 20,676
Oliver Iron & Steel Corp., Pittsburgh; carriage bolts 12,234
Pope Trading Corp., New York; tin, pig 10,680
Prentiss Vise Co., New York; vises 16,266
Remington Arms Co., Inc., Bridgeport, Conn.; cartridges 8,139
Republic Steel Co., Union Drawn Steel Div., Beaver Falls, Pa.; steel, cold drawn 30,720
Rustless Iron & Steel Corp., Baltimore; steel 13,471
St. Pierre Chain Corp., Worcester, Mass.; forgings 23,310
Salem Engineering Co., Salem, Ohio; furnaces, annealing 49,870
Seamless Products Co., New York; oil cans 14,072
South Bend Lathe Works, South Bend, Ind.; lathes, bench 8,983
Taft-Peirce Mfg. Co., Woonsocket, R. I.; gages 17,367
Talon, Inc., Meadville, Pa.; gages 21,512
Tungsten Electric Corp., Union City, N. J.; tools 58,775
Union Twist Drill Co., Athol, Mass.; tools 5,077
cutting tools 14,659
Veit & Young, Philadelphia; dies 9,960
Wallace Barnes Co., Bristol, Conn.; lock wires 6,261
Whitman & Barnes, Philadelphia; drills 6,312
Wiedemann Machine Co., Philadelphia; gages 9,550
Williams Oil-O-Matic Heating Corp., Bloomington, Ill.; gears, oil 11,500
Wright Aeronautical Corp., Paterson; parts 27,941
Yale & Towne Mfg. Co., Philadelphia; lifting trucks 5,265
Yellow Truck & Coach Mfg. Co., General Motors Truck & Coach Div., Pontiac, Mich.; spare parts for service trucks 22,125

War Dept., Other Agencies:

S. G. Adams Co., St. Louis; trays, mess $5,700
Aircraft Appliance Corp., Chicago; cover assys. 51,972
Allis-Chalmers Mfg. Co., Boston; oil circuit breakers 17,520
Bethlehem Steel Co., Seattle; reinforcing steel 15,400
reinforcing bars 13,121
S. Blickman, Inc., Weehawken, N. J.; hospital equipment 149,030
Wm. R. Bootz, Evansville, Ind.; component parts, accessories and equipment for field ranges 123,575
Brown & Sharpe Mfg. Co., Providence; milling machines 37,920
Buda Co., Harvey, Ill.; repair parts for earth auger 25,913
Clauss Shear Co., Fremont, Ohio; scissors 9,000

At Last...

THE KIND OF HOIST YOU WANT AT THE PRICE YOU WANT TO PAY

It's a real, wire-rope hoist — full electric — with push-button control . . . and with interchangeable mountings for rigid, trolley or hook suspension.

CAPACITIES:
250 Lb. - 500 Lb.
1000 Lb. - 2000 Lb.

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● The Zip-Lift's amazingly low prices (starting at only $140) have been made possible through a combination of unique modern design and volume production. It means new low costs for "thru-the-air" handling of heavy loads around machine shops, assembly lines, loading zones, etc. The Zip-Lift is a compact, portable hoist; easy to install; plugs into any standard lighting circuit. For full details, ask for Bulletin H-20.

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HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

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For **INDUSTRIAL** purposes a great variety of sizes and shapes of perforations are required, ranging from very fine to as large as 6" or more in diameter. We are equipped to supply all standard perforations in all kinds and thicknesses of metals.

ORNAMENTAL patterns are covered by our grille catalog. If interested, we hope you will send for it. There are attractive patterns for different uses.

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Quality Springs

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30 MAIN STREET BROOKLYN, N.Y.

LEE-BUILT TRADE MARK SPRINGS

Continental Can Co., Inc., St. Louis; cans and containers ...	7,446
Coolerator Co., Duluth; refrigerators	6,823
Detroit Steel Products Co., Detroit; windows, casement steel.	7,267
DeVilbiss Co., Toledo, Ohio; paint spraying units	9,677
Electrical Mfg. Co., Battle Creek, Mich.; anchors	23,677
Elgin National Watch Co., Elgin, Ill.; navigation watches	113,928
Equitable Equipment Co., New Orleans; steel cargo barge	14,850
Firestone Tire & Rubber Co., Seattle; tires and tubes	4,405
Julian P. Friez & Sons Div., Bendix Aviation Corp., Baltimore; wind vanes	6,500
General Electric Supply Corp., Boise, Idaho; parkway cable ..	5,120
Geuder, Paeschke & Frey Co., Milwaukee; dish pans	8,849
Harris Hub Bed & Spring Co., Cicero, Ill.; hospital equipment.	179,219
Hussmann-Ligonier Co., St. Louis; ice boxes	13,824
Edward Katzinger Co., Chicago; ladles and pans	9,316
Kearney & Trecker Corp., West Allis, Wis.; milling machines ..	7,420
Kollsman Instrument Div., Square D Co., Elmhurst, N. Y.; indicators and generators	36,715
indicator and tube assys.	27,640
altimeters	237,905
Manning, Maxwell & Moore, Inc., Chicago; clamps	5,426
Morton Mfg. Co., Chicago; cover assys.	67,694
North American Aviation, Inc., Inglewood, Cal.; leak proof fuel tanks	78,920
Penn Surgical Mfg. Co., Inc., Philadelphia; surgical instruments	16,592
Pittsburgh Water Heater Co., Pittsburgh; gas water heaters.	7,171
Savory, Inc., Buffalo; skimmers, measures, etc.	6,135
Seattle Steel Co., Seattle; wire..	10,575
Seifreat - Elstad Machinery Co., Dayton, Ohio; honing machines	54,584
S. Sklar Mfg. Co., Long Island City, N. Y.; surgical instruments	14,663
Superior Sleeprite Corp., Chicago; nurses desks	36,479
Tennessee Coal, Iron & Railroad Co., Birmingham; corrugated metal pipe	11,937
Tissier Hardware Co., Selma, Ala.; steel fencing	9,077
United States Gage Co., Sellersville, Pa.; gages, air pressure..	6,500
Wright Aeronautical Corp., Paterson; aeronautical engines	149,512

First Quarter Earnings

• • • **Warner & Swasey Co.**, Cleveland, reported net earnings for the first quarter of 1941, after all deductions including provision for estimated federal taxes of $1,040,077 or $1.27 per share, as compared to net earnings of $1,010,909 or $1.24 per share for the first quarter of 1940.

First quarter net profit of $774,855 is reported by the Interlake Iron Corp., and subsidiary, after provision for federal normal income tax based on the 1940 Revenue Act but before allowing for excess profits tax. Earnings are equal to 39c. per common share and compare with a net loss of $109,322 in the first period of last year.

REELECTED AS president of the Porcelain Enamel Institute at the 10th annual convention of the organization at French Lick Springs, Ind., is P. B. McBride, of the Porcelain Metals Corp., Louisville, Ky.

CIO To Investigate Stuffing Of Strike Ballots

Milwaukee

• • • **The stuffing of about** 2400 ballots in the strike vote that tied up the Allis-Chalmers plant for 76 days will be investigated by the international CIO office following the request of the Milwaukee UAW regional director to R. J. Thomas, Detroit, international president. The investigation committee will have "two or three" members, all preferably UAW representatives not living in Milwaukee.

Defense Contract Service Explained in Pamphlet

• • • **Appealing to manufacturers** to help the defense program and themselves by making full use of the Defense Contract Service, the OPM has published a pamphlet explaining how to use that Service. Copies, entitled "Defense Contract Service," may be obtained from the Division of Information, Office of Emergency Management, Washington.

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Guaranteed
85% plus in
Calcium
Fluoride
Not to exceed
5% silica
In bulk

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Barges
500 tons
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Wells SAWS
THE SIGN OF SERVICE

YOUR GUIDE *to More Efficient* METAL CUTTING

Now Built in 3 Sizes
No. 5—5" dia. round or 5" x 10" flat.
No. 8—8" dia. round or 8" x 16" flat.
No. 12—12" dia. round or 12" x 12" flat.
Also the No. 9 Upright Saws

SERVICE!—from the factory—from the distributor—and from the SAW! Wells Saws give you big capacity, speed, accuracy and simplicity to handle production work, odd jobs or maintenance work and handle it efficiently. They're real all-around tools that every plant can use—several hundred plants have installed their second and third and *more*. Write to Wells today for complete information. You'll be glad you did.

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Henderson Can Take Over Many Activities of OPM

Washington

• • • **Further clarification of** the executive order establishing the new Office of Price Administration and Civilian Supply indicates that the powers delegated to Leon Henderson are so broad that under the guise of stabilizing prices, he could take over many if not most of the activities now under the jurisdiction of the Office of Production Management.

Already the OPM's division of purchases, under a so-called coordination arrangement with OPACS, has agreed to withhold clearance of Army and Navy contracts if the prices do not conform to regulations established by Mr. Henderson. Moreover, there are some signs that Mr. Henderson may rely on a provision of the executive order to force plant expansion where he deems such a step necessary in the interest of safeguarding against price spirals. The order specifically empowers him "to stimulate provision of the necessary supply of materials and commodities required for civilian use."

Other points agreed to by the OPM division of purchases in an effort to clarify overlapping duties include:

1. The division of purchases will keep OPACS advised of procurement plans and proposals of government purchasing agencies which might influence price stability or affect supplies of civilian goods.

2. OPACS will make its recommendations on steps it desires taken and submit this to the OPM through the division of purchases.

3. In return OPACS will inform the division of purchases of price investigations and proposed regulations which might influence procurement for defense.

4. All facilities and information will be interchanged freely between the two agencies, an arrangement which prompts speculation that eventually the whole division, now under Donald M. Nelson, may be taken over by Mr. Henderson.

5. The division of purchases will not clear proposed contracts in which the prices do not conform to regulations set by OPACS unless the new price agency approves such contracts.

Henderson Plan Leads To Dictator, Taft Says

Washington

• • • "There isn't a shadow of authority for what Mr. Henderson is doing (fixing prices)," Senator Taft said Sunday in a radio roundtable on "How Can We Prevent Inflation?"

"If a man can govern a country by executive order as Mr. Henderson is doing, then we are on the same road to dictatorship as Hitler took," he said. The Senator denied Henderson's assertion that the OPACS had the powers of the old War Industries Board.

CERTAINLY our plant is running at capacity. Certainly we have a backlog of orders. Who hasn't? But you won't find an independent *"sitting-on-our-backlog, got-all-we-can-handle, take-it-or-leave-it"* attitude at Accurate.

You'll find that we're just as anxious to get your business—*and hold it*—as we ever were. We want your inquiries and orders, and if you're in a tight spot, we'll do our best to help you out of it.

Right now we're juggling men and time and materials to give delivery where it's needed as quickly as possible.

Sure, it costs us more to do it that way, but looking ahead a few years, we think that this effort will pay us well in your continued patronage.

Definitely, it may pay *you* today—let's talk it over. Drop us a note or phone now.

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It was this latter arrangement which is expected to set the OPACS up as dictator of what government contracts are to be vetoed when the question of price is under scrutiny.

On the matter of enforcement powers vested in the new price administrator, an analysis of the executive order shows that Mr. Henderson could ask the President to:

1. Invoke Section 9 of the Selective Service Act which provides for the placing of compulsory orders and for the requisitioning of plants in the event of failure or refusal to comply.

2. Invoke Section 120 of the National Defense Act which gives the President broader powers than those contained in Section 9 of the Selective Service Act. However, the declaration of a full emergency would first be necessary, after which the President could act through any department of the government without being limited to the War and Navy Departments as he is under Section 9.

3. Certify to the Interstate Commerce Commission that certain traffic shall have priority in transportation. This power could be used as a sanction in an effort to secure compliance with maximum prices by withholding transportation facilities.

4. Requisition materials denied export in an effort to get an increased supply of materials and enforce compliance.

In order to increase the available supply of materials and commodities, thereby attempting to avoid shortages with potential price increases, Mr. Henderson also could, subject to the veto of the Secretary of the Navy or the Secretary of War, exercise the power conferred by these laws:

1. The law which provides that reserve stocks of strategic and critical materials acquired under a treaty in exchange for surplus agricultural commodities "shall be made available or disposed of by the Commodity Credit Corp. or other governmental agency only upon order of the President in accordance with the terms of the applicable treaty."

2. Section 4 of the Act of June 7, 1939, under which the President can permit the use of stockpiles of strategic and critical materials. These stockpiles are acquired by the Treasury Department's Procurement Division under the direction of the Secretaries of War, Navy and Interior, acting through the Army and Navy Munitions Board.

3. Section 5 of the Reconstruction Finance Corporation Act authorizes the RFC to finance the acquisition of strategic or critical materials as defined by the President.

In addition, the price administrator can act for the President in requesting studies under the Title III of the Tariff Act of 1930. Under this provision, Mr. Henderson could request the Tariff Commission to investigate differences in costs of production of any domestic article of any like or similar foreign articles. The Commission already had undertaken a study of the costs of copper mining.

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The architect for this restaurant wanted "an acoustical ceiling of painted galvanized metal." Naturally he wanted it to stay attractive a long time.

Only a few years ago an order like this went on the "uncertain" list. But here the architect and the owner were sure. They specified ARMCO Galvanized PAINTGRIP.

More than 400 field tests show that paint on ARMCO PAINTGRIP sheets lasts *at least 150% longer* than paint on ordinary galvanized metal. And more than 200 manufacturers of paints and enamels have approved ARMCO PAINTGRIP as an especially suitable base metal for their products.

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Gradual Price Rise Won't Be Inflation, Henderson Believes

Washington

• • • **In a radio broadcast** last Thursday night Price Administrator Leon Henderson cited the fixing of ceiling prices on steel, farm equipment, iron and steel scrap and other products as a fixed policy to prevent inflation and to emphasize its dangers said that a $5 rise in the price of steel per ton represents about as much as a 5 per cent increase in the corporate income tax. He said indications had developed of threatened increases in the price of steel and of farm equipment as a result of wage increases granted in parts in those industries.

"We feel that such wage increases should not be passed on in the form of higher prices unless it is clearly apparent that they cannot be absorbed out of current profits of the companies involved," said Mr. Henderson.

He conceded that a gradual rise in the price level due to "our enormously increased activity, may be inevitable—but it certainly cannot be called inflation."

Apparently replying to criticism that the Office of Price Administration and Civilian Supply does not have authority to fix prices, Mr. Henderson said that "we have the power (to fix mandatory price ceilings) but if more is needed we are prepared to ask Congress for additional legislation." He added, however, that it is desired to avoid "going to law" to achieve our goal of relatively stable prices" and he expressed confidence that businessmen, farmers and labor will cooperate in the effort "once they understand clearly what we are trying to do and why it is important to the whole country."

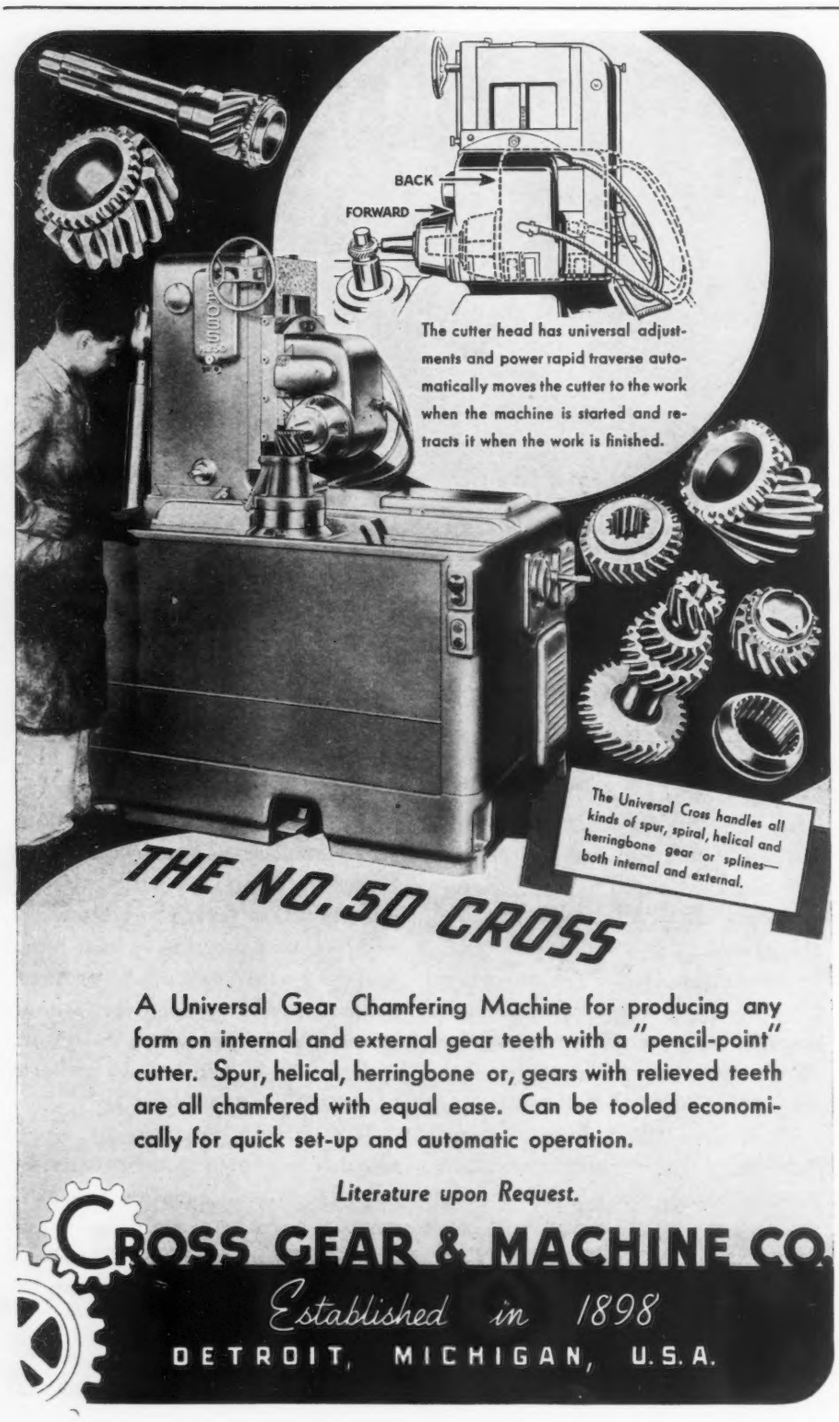
Mr. Henderson said, however, that the problem of maintaining price stability is becoming more difficult and, pointing out that demands for raw material, labor, shipping power and railroad transportation all will be intensified, said further civilian rationing in steel and other products will be necessary. In some cases the materials and facilities available for use by plants manufacturing civilian goods will have to be curtailed sharply, Mr. Henderson stated.

"That situation has already developed in aluminum, zinc, machine tools, steel and some other items," he said. "In other cases, such as copper, it had been avoided only by arranging for imports."

Mr. Henderson is a New Deal expansionist, and he predicted a larger defense program.

"I want to see our defense get every bit of material it needs and get it first," he declared. "I wish we had a bigger program and I expect the logic of coming events will command a bigger program. I foresee larger schedules for planes, ships and ordnance."

Mr. Henderson's remark was given considerable significance since it came on the heels of a re-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Strike Cuts Profit Of Allis-Chalmers

Milwaukee

• • • Loss in net income for the first quarter of 1941 by Allis-Chalmers Mfg. Co. was attributed to the 76-day strike which started in January. Profit was $596,469 or 34c. per share compared to 1940 profit of $969,868 or 55c. a share. Unfilled orders on Mar. 31 reached $72,372,294, more than triple the backlog of $21,313,400 of the year before.

port that one element of the New Deal is urging enormously increased industrial capacity, doubling or tripling the output of planes, ships and ordnance and, adding greatly to the steel-making capacity. Expansionists are saying that steel making capacity is 30,000,000 tons below defense and non-defense needs. Reports are current that the principal promoters of this ambitious program are Mr. Henderson and Lend-Lease Administrator Harry L. Hopkins.

NLRB Orders Election Not Requested By SWOC

Gary, Ind.

• • • To the surprise of the SWOC here, the NLRB has informed it that an election to determine a bargaining agent has been ordered at the Standard Forgings Corp. in East Chicago, Ind. The labor board said the election will decide whether the SWOC or the independent Chicago Die Sinkers Lodge No 100 should represent the die-sinkers in the plant. The SWOC did not ask for the election and had not even challenged the right of the independent union to represent the 19 die-sinkers employed in the plant.

First Ohio Draftee is Recalled to Defense Job

• • • The first Ohio draftee recalled from military service in the Army to fill an industrial defense job is a pattern maker, Pvt. Frank Salot of Cleveland. He returned to Camp Shelby, Miss., early this week for an honorable discharge. He was inducted Jan. 21.

Crucible To Appeal on Steel Prices if Necessary

• • • F. B. Hufnagel, chairman of Crucible Steel Co. of America, said this week he did not believe that "responsible government officers have any intention of doing injustice to stockholders" in connection with the question of higher steel prices.

"Productive property supplied by stockholders is just as indispensable as labor to the national defense objectives and equally entitled to wages for its use.

If I find that government limitations on prices work undue financial hardship on our company, I will lay the facts before the proper government officials with confidence that we shall receive fair consideration," the Crucible chairman said.

-MEN
-MACHINES
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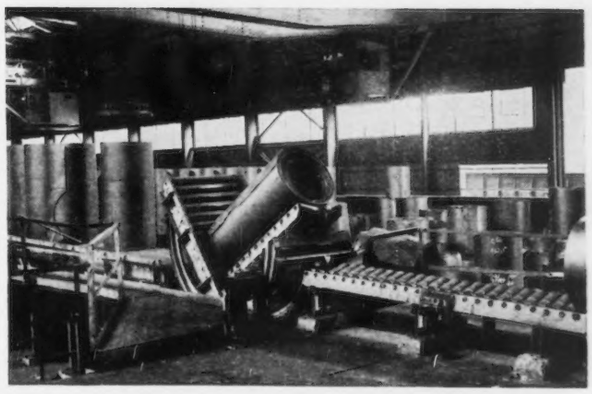

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Defense Work Climbs Steeply at Akron, O.

Akron, Ohio

• • • **Akron's participation** in the national defense program has been advancing quickly recently, principally through negotiated contracts given the steel products division of Firestone Tire & Rubber Co.

Firestone now holds a contract for Bofors gun mounts, a large order for bullet clips and contracts for around 400,000 shell cases per month of the 105 and 90 mm. types.

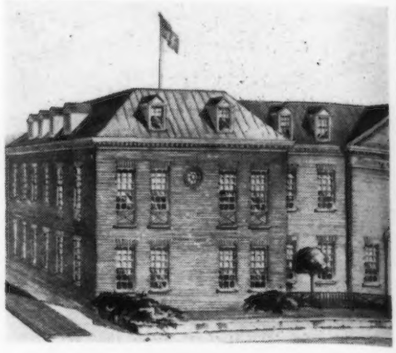
It is understood the shell cases and bullet clips will probably be made at the company's Fall River, Mass., plant with the gun mounts scheduled to be made here. Ground has been broken for a $500,000 plant addition here. The building, a 324 x 624 ft., one-story structure, is expected to be completed in 60 days. In connection with the shell case award the company will probably require around $1,500,000 worth of equipment.

At the same time Goodyear Aircraft here is expanding rapidly to make sub-assemblies for bombing planes. Last week the company was in the throes of spending around $2,700,000 in new production equipment.

In addition to the new Firestone shell case contract the whole shell program has been gathering momentum in the Middle West recently. The government has decided to place a big forging plant in the vicinity of Dayton, Ohio. This will help feed the new shell loading plant at Ravenna, Ohio, near here. Mullins Mfg. Co. at Warren, Ohio, is getting ready to produce 3-in. and 105-mm. shell cases Globe Machine & Stamping Co., Cleveland, is producing 37 mm. shell cases. Chase Brass will erect a $16,000,000 plant in Euclid, a suburb of Cleveland, for shell case production.

With Chrysler, Oldsmobile and Willys Overland producing projectiles, and Jones & Laughlin Steel Corp. tooling up to produce 250,000 105-mm. forgings per month, the program is beginning to open up.

Dresser Mfg. Co. in western Pennsylvania, which received an educational order a year ago for



PLANS BY JEFFERSON: Wrought iron grills designed by Thomas Jefferson for his home at Monticello were copied for this unusual Chicago plant of the Lindberg Engineering Co. The company manufactures heat-treating equipment used extensively in making airplanes, gun parts and shell cases. The plant,

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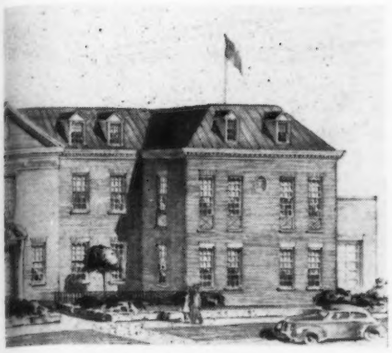

to be occupied fully by May 15, is designed for straight line production on most types of furnaces, and is a faithful reproduction of Williamsburg Georgian architecture. The brick work is laid up in Flemish bond with salmon pink stretchers and black headers set in authentic pink buff mortar, utilizing sand shipped from Virginia.

81-mm. forgings, has recently received an award for 300,000 units. International Harvester is understood to be producing around 10,000 75-mm. shells per week. Railway Steel Signal, Oil Well Supply and National Tube are other companies prominent in the business.

It is expected that in the next three weeks numerous additional contracts will be negotiated. Equipment for production of armor piercing shell has been ordered recently by a New England company holding a British contract.

The Austin Co., Cleveland construction firm, is understood to be engineering a vast ammunition project in the vicinity of Fort Worth, Texas. This is one of the largest projects of its kind.

The new Plum Brook ordnance plant near Sandusky, Ohio, is going ahead at a fast rate, although still in the early construction stage. The general contractor is E. B. Badger & Sons of Boston, Mass.

Illinois Gets 62 New Plants

Springfield, Ill.

• • • **Industrial growth in** Illinois this year is ahead of 1940 when 62 new industrial plants, employing 17,300, were added to the state's list. New plants employing 15,760 and representing a $43,290,000 investment, are under way. Plant expansion is soaring, 142 factories already having spent $54,000,000 and provided employment increase of 5000.

1940 Rail Output 1,678,986 Net Tons

• • • **Total production** of rails in 1940 was 1,678,986 net tons, according to report issued by the American Iron and Steel Institute. This compares with 1,312,647 tons produced in 1939 and was the largest total for any year since 1930 when production was 2,098,021 tons. The 1940 output consisted of 1,629,344 tons rolled from open hearth ingots, 3,448 tons rolled from open hearth rail seconds, 686 tons rolled from bessemer and electric ingots, 45,411 tons rolled from old rails. Of the 1940 total, 140,443 tons were 60 lb. or less per yard.

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(1) Greater melting speed and lower production costs because the optimum angle of rock is maintained at all times.

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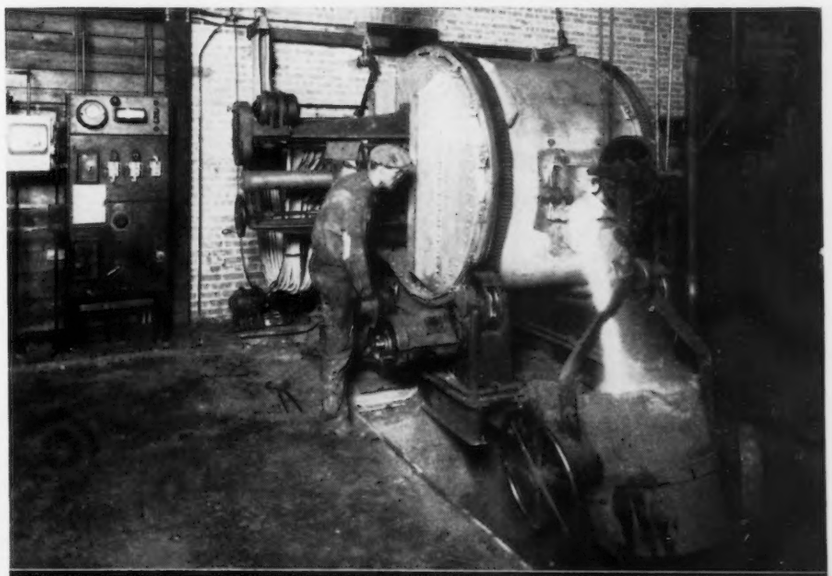
But don't take our word for these claims—find out for yourself. Let us arrange for you to see a few of these furnaces in operation and talk to their owners yourself. Get the lowdown first hand from those who know. Write for further facts today.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

Report Steel Seeks Trust Law Immunity Denied By Jackson

Washington

• • • **Rumors that the steel** industry, looking to reallocation of defense orders under OPM direction, had sought assurance against anti-trust protection were denied in a statement last Friday by Attorney General Robert H. Jackson simultaneously with a conference the National Defense Committee of the American Iron and Steel Institute held with Samuel R. Fuller, chief of the OPM Materials section. The meeting was said to relate to defense production. Earlier reports were current that in a letter to OPM General Counsel John Lord O'Brian, the attorney general had approved of a plan of collaboration among steel manufacturers to redistribute steel orders. Mr. O'Brian declined to make the attorney general's letter public, although Mr. Jackson said he had no objection to the publication of its text. Credence is given to reports that the attorney general approved the setting up of a steel industry defense committee.

In his public statement, however, Mr. Jackson said that the Department of Justice has made no commitment of any character to refrain from prosecution of the steel companies on anti-trust law violations.

"So far as I know, no industry or group of industries has sought exemption from the anti-trust laws," Mr. Jackson said.

He pointed out that if in order to step up production of defense materials, the industries are asked by the government to reduce production of non-defense material, this does not constitute a conspiracy against the public interest, "and, of course, is not a violation."

Continuing, Mr. Jackson's statement added:

"I believe that businessmen are justified in expecting that so far as possible uncertainties as to the application of anti-trust law will be eliminated, when they are asked by the government to join in a cooperative effort. This is not for the purpose of sanctioning violations but for the purpose of seeing that violations do not take place and at the same time that the defense effort is served.

"Mr. John Lord O'Brian, General Counsel for OPM, and this Department have agreed upon a plan of procedure by which questions of this character will be defined by OPM and by industries involved and may be presented to this Department.

"No question relating to the steel industry has been submitted to this Department under this plan of procedure. It is a general procedure for the exchange of information and requests between the two Departments and is equally applicable to all industries engaged in defense work."

It would be viewed by the Department as a violation of the anti-trust law and prosecution could be expected, Mr. Jackson said, if any industries should agree that they would reduce production in order to hold up prices to the consumer. Pointing out that the national defense production program requires establishment of some priorities, allocations and unifications to achieve efficient production, the Attorney General stated that these acts also, "if undertaken by private agreement among industries for the purpose of enlarging their control of commodities or enhancing prices, would be violations of law."

Members of the Steel Defense Committee who consulted with Mr. Fuller were:

Benjamin F. Fairless, president of the United States Steel Corp.; E. G. Grace, president of the Bethlehem Steel Co.; Ernest T. Weir, chairman of the National Steel Corp.; and T. M. Girdler, chairman of the Republic Steel Corp.

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1 Bomber = 60,000 Percolators

• • • **One bomber** requires enough aluminum to make 60,000 coffee percolators, Blackwell Smith, assistant director of the OPM's Priorities Division, said in an address this week at Washington.

List of 76 Standard Steels Offered by A. I. & S. I. Committee

• • • **To increase efficiency** in production of steel by encouraging a reduction in the number of kinds of steel ordered, the General Technical Committee of the American Iron and Steel Institute has selected a list of 76 standard alloy steels, after a two-year study of the needs of consumers.

If production can be concentrated on those standard steels, it is hoped to expedite deliveries and make possible many other advantages for buyers as well as for producers of alloy steels. The committee has selected compositions of proved merit, which have been used in large tonnage for a wide variety of purposes. Pig iron has also been studied by the committee, and a list of standards prepared.

Alloy steels other than tool steels and stainless steels have hitherto been made by steel companies in several thousand different combinations of chemical elements. The standardization of such alloy steels should greatly reduce the number of varieties specified by consumers. In this way, the effectiveness of research work on steel should be greatly increased, advances should be made in manufacturing methods, and service to consumers should be improved.

The study made by the technical committee has shown that out of the thousands of varieties of alloy steels produced each year, a relatively few accounted for the bulk of the tonnage. In 1940, approximately 96 per cent of the total output of tonnage alloy steels was accounted for by only 55 different varieties, the study indicated.

Standardization is expected to reduce the unnecessarily wide range of specifications for normal peacetime products, as well as to

SCRAP SHOW IN A SUBWAY: Collection of scrap metal has become a vital task for every Briton. Shown in horn-rimmed glasses is Herbert Morrison, British Minister of Supply, inspecting a scrap iron and steel exhibit held recently in the ticket hall at Charing Cross Underground station, London. At the left is Lord Ashfield and center G. Wood, in charge of iron and steel control. *Photo by Topical Press*

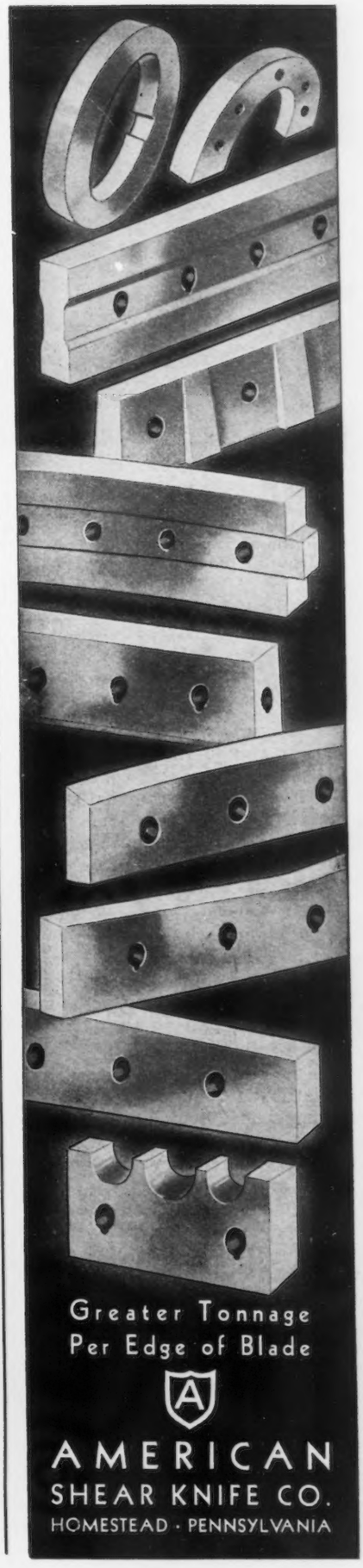

Photo by International

COAL STRIKE NEGOTIATORS: As the shortage of coal threatened steel production and the defense program, these men, representing miners and soft coal operators, attempted to end the 28-day strike. They are left to right, Philip Murray, CIO head; L. T. Putnam, a spokesman for the operators and John R. Steelman, Federal Labor Conciliator. The coal strike has been turned over to the National Defense Mediation Board for settlement.

expedite deliveries during the defense emergency.

The study was prompted by the growing variety of chemical compositions and quality requirements of steel consumers in recent years. This trend has been a matter of concern to steel producers, because it increased manufacturing difficulties and slowed down production.

In most cases, consumers can use the standard steels to replace many of the similar non-standard grades now being used, without changing their manufacturing methods or impairing the quality of the article manufactured.

The committee has taken as standards the ranges and limits of composition which have been widely used by steel producers and consumers in recent years for the various alloying elements, such as nickel, molybdenum and chromium. The list of standard steels is largely based on these standard ranges and limits.

Alloy steels other than the listed standard steels may occasionally be required by consumers for specialized uses. Specifications for such non-standard steels will continue to be based on the standard ranges and limits of composition.

A system of symbols has been set up to identify the various classes of standard steels. Numerals are used to indicate the chemical composition of the different grades of steel, while capital letter prefixes indicate whether the alloy steel is made by the open hearth or electric furnace method. Letters suffixed to the numerals indicate special requirements affecting quality, such as guaranteed hardenability, non-metallic inclusion tests, and guaranteed heat treatment results.

Foundrymen Survey Raw Materials Consumption

Cleveland

• • • **The Gray Iron Founders** Society, Inc., is making a national survey to ascertain consumption of all raw materials by gray iron foundries in 1940 and anticipated consumption in 1941, according to W. W. Rose, executive secretary, who not long ago completed at the request of Washington a survey on consumption of scrap rails.

Results of the survey, it is expected, will be of widespread interest and form valuable basic information which Washington authorities can rely on principally on the question of serving foundries with the scrap which they must have in order to carry on their operations in connection with the national defense program.

"Molybdenum for Tungsten Steels" Surveyed for OPM

Washington

• • • **Molybdenum high-speed** steels can be substituted for tungsten steel "rather sweepingly if the necessity arises," according to a preliminary report made by the Advisory Committee on Metals and Minerals of the National Academy of Sciences to the OPM Materials Branch. The study pointed out that there will be places in which a substitution of molybdenum high-speed steels for tungsten steels will result in an impairment of quality. It was added, however, that "the dislocation incident to substitution will not be caused by the inherent quality of the finished tools, if properly manufactured and heat treated, but in the heat treatment operation. Necessity may force many shops to acquire better heat treatment facilities."

In connection with alloy tool steel, the report makes suggestions for substituting molybdenum for tungsten, but warns that such substitutions "should be approached with caution and usually only after trial." The same qualification is attached to suggested substitution in the case of die steels for hot working. Substitution of molybdenum for tungsten in valve and valve insert steel and in intake valves for aircraft engines is not recommended at the present time.

This study was requested by the Materials Branch, in an effort to be prepared should there be any curtailment of imports of tungsten. The United States, although a large producer of tungsten, normally imports 50 per cent more than it produces, and while the present tungsten supply is about enough for all uses, a curtailment of imports would result in an eventual shortage. The United States produces most of the world's output of molybdenum and it, therefore, is more available than tungsten.

China and Latin America are the chief sources of tungsten ore for this country. Other important foreign producers are Burma, Portugal, the Malay States, and Australia.

Trade Notes

Barney Castor, 1957 Fletcher Avenue, South Pasadena, Cal., has been appointed factory representative in California for Simpson mixers and National Engineering Co. equipment.

•

Washington, D. C., offices and display rooms have been opened by the Buda Co. because the firm's heavy defense manufacturing made it imperative to have permanent quarters in the nation's capital. The new office will be directed by Col. H. H. Frost, vice-president of Buda; G. C. Humphreys will be manager of engineering; and E. C. Asher, office manager.

•

Kenosha Machine & Grinding Co., Kenosha, Wis., has geen organized by Edwin Erdman, Gale Blordgett and Joseph Grabinsky to deal in all kinds of wood, steel and iron working machines.

•

Twin Disc Clutch Co., Racine, Wis., has leased with option to buy the buildings and property of the Rockford Fibre Container Co. at Rockford, Ill., comprising 49,800 sq. ft. of space with about 14 acres of adjacent land.

•

Meehanite Metal Corp., Pittsburgh, has granted rights to manufacture Meehanite castings to Compania Argentina de Talleres Industriales, Transportes y Anexos, Buenos Aires. This company manufactures automotive parts, machinery, machine tools, marine equipment, and electrical and refrigeration equipment.

The aviation crane department of American Monorail Co., Cleveland, is now located in new quarters on Barberton Avenue in a building formerly occupied by the Bender Body Co. Contracts from the aviation industry for materials handling equipment have been heavy due to the wave of aircraft plant expansion.

•

Reynolds Metals Co. has opened offices at Longview, Wash.

•

Aircraft & Arms Procurement Co., Syracuse, N. Y., has incorporated as the Aircraft & Arms Consultants, Inc., Chimes Building, Syracuse.

•

Metals Protection Corp., owner of patents on chromium plating, has leased a two-story and basement building at 425 S. State Street, Indianapolis, Ind., to engage in manufacture of buffing and polishing compositions. The Metals Protection Corp. was incorporated 20 years ago and is one of the earliest companies in the nation to take up research and development of chromium plating processes on which it later sold patents to the General Motors Corp. and other large manufacturers.

Paul C. Cullom is president of the organization. Production will be in charge of Robert Piscator.

•

Master Chrome Service, Inc., rebuilders of pneumatic tools and other industrial parts by hard chrome plating, has moved into a new plant on Herman Avenue, Cleveland.

Holland-Reiger Corp., Sandusky, Ohio, a division of Apex Electrical Mfg. Co., has acquired the Sweeper-Vac Co., Worcester, Mass. Sweeper-Vac Co. has been making hand and floor electric sweepers since 1907. Tentative plans call for removal of the manufacturing operations and sales offices from Worcester to Sandusky. Metal furniture made at Worcester by Sweeper-Vac will continue

•

Meehanite Metal Corp., Pittsburgh, through its offices in London—The International Meehanite Metal Company, Ltd.—has granted rights for manufacture of Meehanite castings to Holman Brothers, Ltd., Camborne, Eng., manufacturer of compressors and mining machinery.

•

Precision Tool & Mfg. Co., Westfield, Mass., located in the former Ensign Box Co. building, expects to start production of precision products such as tools, instruments and parts for the aviation industry early in June. C. A. Mayer, for 20 years factory manager of the American Bosch Corp., heads the company. Manufacturing space is being adjusted and mechanical equipment installed.

•

Sanders Co., Elizabeth City, N. C., wholesale and retail dealers in mill, marine and plumbing supplies and general machine shop and foundry work, has been organized by Brad, Bradford and Clarence Sanders. The new firm has acquired the iron works and mill and marine supply divisions of the Elizabeth City Iron Works & Supply Co.

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Concrete Bar Institute Elects Healy President

• • • **The Concrete Reinforcing** Steel Institute at its annual meeting last week at The Homestead, Hot Springs, Va., elected Ralph F. Healy of Igoe Brothers, Newark, N. J., president for the ensuing year. Blair M. Boisseau of the Virginia Steel Co., Richmond, Va., and S. V. Taylor of the Concrete Fireproofing Co., Detroit, were elected vice-presidents.

Directors were elected as follows: A. S. Bennett, Alamo Iron Works, San Antonio, Tex.; W. C. Kiesler, Rosslyn Steel & Cement Co., Washington; James D. Maitland, Colorado Builders' Supply Co., Denver, who has been president of the institute the past year; J. H. Verschleiser, Laclede Steel Co., St. Louis.

The autumn meeting of the institute will be held at the Broadmoor Hotel, Colorado Springs, Colo., about Sept. 10 to 12.

Sessions of the convention were devoted to informal discussions, chiefly having to do with tolerances.

A proposal that intermediate grade be made the standard for reinforcing bars, which would mean the discontinuance of structural grade, was discussed and then referred to the committee on mill relations. It was brought out that restriction of concrete bars to the one grade would lighten the inventory burden for warehouses, but there were some objections, chiefly from California, where the danger from earthquakes has brought about the adoption of structural grade in state and municipal building codes. It was said that approximately 85 per cent of mill shipments of concrete bars is intermediate grade.

Tests of twin twisted reinforcing bars, of which the Isteg bar is the conspicuous example, which are being made at Columbia University, will be completed in about 30 days, at which time a report of the results of the tests will be issued. The tests are being made to support the contention that the New York City building code, which now favors the twin twisted bar, should be altered to include other types of bars.

Industrial Truck Sales At High in Dollar Volume

• • • **While March domestic** bookings of electric industrial trucks and tractors in units were somewhat lower than the record peak reached during February, the dollar value reached a new high, figures released by the Industrial Truck Statistical Association, 208 South LaSalle Street, Chicago, reveal. During March 436 units were booked, compared with 112 in the same month of 1940, and 478 in the preceding month.

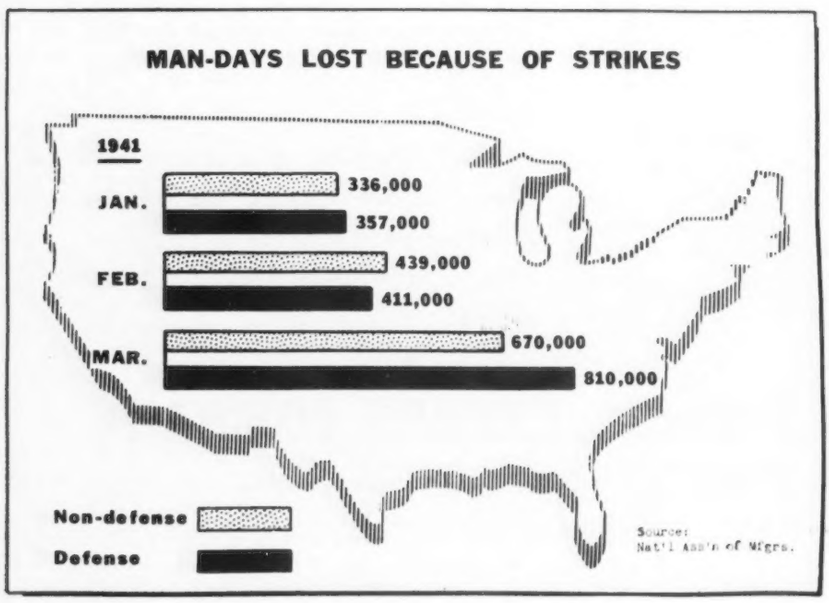
Total net value of chassis only was $1,557,591.91 compared with $376,439 in March, 1940, an increase of 313 per cent, and $1,441,521.50 in February, an increase of 8 per cent.

Forty-five non-elevating platform trucks with capacities and base chassis prices ranging from 2000 to 10,000 lb. and $1,200 to $3,965 respectively had a total net value of $89,030. All net values are at factories, after additions and deductions for variations from standard specifications, trade in allowances, etc., when applicable. There were 318 cantilever trucks, with capacities and base prices ranging from 1200 to 25,000 lb. and $1,200 to $13,865 respectively, with a total net value of $1,223,967; 60 crane trucks, capacities and base chassis prices ranging from 3000 lb. at 7 ft. to 6000 lb. at 6 ft. radius and $4,250 to $5,475 respectively, had a total net value of $228,976; 10 light and heavy duty tractors with base prices ranging from $1,395 to $2,275 had a total net value of $16,728.91; three special trucks, capacities and base chassis prices ranging from 2000 to 3500 lb. and 79 cu. ft. and $1,770 to $5,750 respectively, had a total net value of $11,995.

Strikes Certified To Mediation Board

(Plant stoppages in this list were submitted to the National Defense Mediation Board and had not been settled prior to April 21)

Case	*Location*	*Date of Strike*	*No. of Men Involved*	*Date Cert. to Board*
Cowles Tool Co.	Cleveland, Ohio	Feb. 27	80	April 5
Phelps-Dodge Co.	Elizabeth, N. J.	April 8	1,800	April 8
J. Sklar Mfg. Co.	Long Island City, N. Y.	April 4	495	April 9
California Metal Trades Assn.	San Francisco, Cal.	April 7	1,500	April 15
Birdsboro Steel Foundry & Machine Co.	Birdsboro, Pa.	April 4	1,209	April 17
Arcadia Knitting Mills	Allentown, Pa.	April 3	210	April 17



Bryant Cites Role of Machine Tool Dealers

Washington

• • • **The vital part played** in the building up of national defense by machine tool sales engineers was stressed by several speakers at the spring meeting of the Associated Machine Tool Dealers of America, held on Monday, April 28, at Washington. A. G. Bryant, Bryant Machinery & Engineering Co., pointed out how fortunate it was to the defense industries as well as to machine tool manufacturers that dealer salesmen, covering limited trade areas, have the advantage of such an intimate knowledge of their customers' plants and requirements as to enable them to serve the trade quickly and accurately. Recalling the tradition of partnership and mutual helpfulness and long years of personal association between the machine tool manufacturers and sellers, Mr. Bryant said that this natural and traditional affiliation and cooperative effort have been extended farther than ever in order that industry might successfully meet the enormous responsibilities placed upon it.

Speaking for the machine tool builders, Wendell E. Whipp, president, Monarch Machine Tool Co., agreed that the manufacturers of machinery will need all help possible from dealer sales engineers. Such men will serve as the eyes of the machine tool industry in reporting technical difficulties as they arise in the field. On many new jobs, he said, the real tool engineering will be done by the sales engineers. Part of their present job also is helping manufacturers to get going on existing equipment. Mr. Whipp considers the opportunities afforded sales engineers in this emergency a valuable training for the difficult days that lie ahead, after the present emergency is over and the United States is faced with intense low-priced competition in world markets, no matter who wins the war. The only way for industry to survive will be to excel in low-cost production and it will devolve upon the machine tool sales engineer to develop new methods. He predicted that machines will be developed that will far exceed in productivity anything on hand now.

U. S. War Plane Near German Output Level

• • • U. S. fighting plane production is "very near" the British and German monthly production rates which are now estimated at about 1500 each, Col. John H. Jouett, president of the Aeronautical Chamber of Commerce, Inc., says.

In a speech which was a highlight of the U. S. Chamber of Commerce annual meeting at New York, Col. Jouett said: "Since the graver phase of the national emergency began (July, 1940), our people have built nearly 7000 military planes. The production curve has been accelerating steadily — 700 in November, 800 in December, 1000 in January, 1200 in March."

The problem of future markets was also touched upon by Mr. Bryant earlier in his talk. While today the emphasis is on production, tomorrow it will be on marketing, he said. The machine tool dealer must then again, in addition to his duties of giving engineering counsel to the trade and of servicing the machines he sells, furnish the initiative and the ingenuity to find applications for his manufacturers' products and convince potential users of new types of machine tools. In his concluding remarks, Mr. Bryant said: "Yesterday the country nearly forgot one of its best friends, and the manufacturers and dealers of the machine tool industry survived only by a tenacity of spirit. Today, manufacturers and dealers of the industry are contributing a service to the country in a spectacular demonstration of its usefulness. Tomorrow we hope the country will not forget, and we know that the industry will continue to serve economically and proficiently through its manufacturers and its dealers in the upbuilding of American standards of living."

All of the large shops here and abroad are turning shell today with steel cutting carbide tools, at speeds up to 450 surface feet per min., according to Philip M. McKenna, McKenna Metals Co., who spoke on the rapid strides made by such cutting tools in the last three years. Quoting from some German texts, Mr. McKenna showed that as far back as 1934, the Germans had begun to economize on tungsten by using it in the form of the cemented carbides rather than high speed steel. Although three-quarters of tungsten carbide is tungsten, the fact that the material is used in the form of a small tip, cuts at three times the rate of high speed steel and lasts several times longer, makes it from 20 to 60 times as effective as high speed steel, pound for pound of tungsten employed. Mr. McKenna gave much technical data on carbide cutting performance and illustrated a number of typical applications.

The only other technical paper presented was a review of the manufacture and application of plastics, presented by L. B. Gillie, E. I. du Pont de Nemours & Co. Although the first plastic—celluloid—was discovered almost 70 years ago, and bakelite was discovered in 1907, the real impetus to the plastics industry did not come until 1929. There are now 13 plastics in common use of either the thermosetting or the thermoplastic type. About 160 million pounds of plastics are molded annually in about 600 plants. The automotive industry is the largest consumer. The greater part of Mr. Gillies' talk was devoted to injection molding of thermoplastics, like cellulow acetate, and he illustrated the many types of injection molding machines available.

Mason Brittin, director, tools section, OPM, in an off-the-record talk, spoke frankly of the tremendous problem of upping production of defense items in geometrical ratio. He said that the dealer group as a whole was one of the most important parts of the machine tool industry and was cooperating in the best possible way with the Army and Navy and defense contractors. F. B. Scott, Jr., Syracuse Supply Co., and president of the association, presided at all meetings, which took place on the one day only.

Warner & Swasey Pays 40c.

• • • **The board of** directors of the Warner & Swasey Co., April 22, voted a dividend of 40c. per share on the company's common stock, payable May 27, 1941, to stockholders of record May 13.

Complaints On Price Freezing Few So Far

Washington

• • • **Complaints of small** steel companies against the steel price freezing order are being studied by the Office of Price Administration and Civilian Supply and are proving a hard nut to crack. The complaints, however, are said to be surprisingly few so far.

The tenor of them is that these small companies are unable to absorb a 10c. an hour increase in wages at the first quarter prices established by United States Steel Corp. subsidiaries.

In instances adherence to the order would mean a reduction in price. Because this is true of the Phoenix Iron Co., Phoenixville, Pa., it has requested relief from the order and for the purpose of determining the advisability of granting this request the OPAC is making a study of the company's previous policy, its earnings record, its order backlog and related matter. Those working on the study include C. A. Bishop, Edward France, steel expert; George Heidlebaugh, attorney, and Dr. H. F. Taggart, cost accountant. Central Iron & Steel Co., Harrisburg, Pa., has made a similar request to continue its recent prices which have been higher than the recent market level.

Officials of the company pointed out that prior to March 31 they were charging more for structural steel shapes than the prices quoted for such products by larger companies. It has asked that it be permitted to continue its previous price practice although it would thus be charging more than large companies. There is no question involved in this case, the OPACS said, of passing on higher wage rates by price increase. This would mean a dual price system. Other small companies are said to be complaining on the same grounds as those of the Phoenix Company while a broader protest is made by small companies that they cannot absorb the 10c. an hour wage increase at first quarter prices.

There is said to be a division of opinion at present among OPACS officials regarding the policy of handling individual cases. One view appears to favor strict application of the order to all steel companies during a test period. Another view is said to be favorable to granting exceptions and allowing higher prices for companies that clearly show they cannot operate without loss if they are required to absorb the 10c. an hour wage increase.

Law Broadening Priorities Sought By Stettinius

Washington

• • • **Broadening of the** statutory powers over the administration of the priorities system to extend mandatory priorities to subcontractors, to require more information from industry, and to protect persons complying with priority orders against liability for damages was asked on Monday by Director of Priorities Edward R. Stettinius, Jr.

Appearing before the House Naval Affairs Committee, Mr. Stettinius testified that the present statutory authority refers only to contracts or orders of the Army and Navy and is only "partially effective" because in most instances the important point at which to obtain the preference comes down the line in the subcontracts for parts, castings, supplies and materials which enter into the finished product.

Mr. Stettinius asked for an amendment to the law passed by Congress last session, the purpose of which would be to:

1. Permit the assignment of mandatory priorities to contracts or orders of any foreign government which the President brings within the terms of the lend-lease bill.

2. Permit the assignment of manadatory priorities to any contract or order of a government agency other than the Army or Navy or of private industry which is of vital importance to the defense program.

3. Make clear that mandatory priorities may be extended to subcontracts and sub-orders for parts, supplies and materials which enter directly or indirectly into the fulfillment of the prime contracts which are subject to mandatory priorities.

4. Permit control of the distribution of those products and materials in which shortages appear by reason of the impact of the defense program and to permit the allocation of such products and materials to defense and to the most important civilian needs in preference to less important users.

5. Permit adequate information to be obtained to operate the priorities system. (This amendment would require industry to submit data on inventories, rates of use, and the purpose for which material ordered will be used by customers.)

6. Protect persons complying with priority orders against liability for damages.

$175 Million Ship Program For Canada

Ottawa

• • • The Department of Munitions and Supply announces that a shipbuilding program costing $175,000,000, the largest ever undertaken in Canada and going to yards on the Pacific Coast, will be started immediately. Ninety-six cargo freighters of 10,000 tons are to be built jointly on Canadian and British account. The undertaking is the first initiated by the new Government company, Wartime Merchant Shipping, Ltd., under direction of H. R. MacMillan. Contracts for 26 ships of this tonnage were closed a few days ago, and negotiations for the other 70 are being completed. It is further pointed out that additional orders for ships are to be placed with shipbuilders in Eastern Canada.

Koppers Negotiates For Granite City Blast Furnaces

Pittsburgh

• • • **Koppers United Co.** here was negotiating this week for the purchase for operation of two blast furnaces and a battery of coke ovens owned by the Granite City Pig Iron Co., Granite City, Ill. These furnaces have not operated for several years. If the present negotiations should go through, it is believed that a good portion of the iron manufactured will be consumed by Granite City Steel Co., Granite City, the balance to be available for market sale.

Defense Strikes Rise Sharply in 1st Quarter

• • • **Strikes at plants** engaged in War Department defense production and construction increased rapidly during the first three months of 1940, Edward F. McGrady, special consultant to the Secretary of War, indicated this week at Washington.

Mr. McGrady told a Senate committee that there were 127 such strikes from Jan. 1, 1941, through April 25, 1941, and that man-days lost in these strikes, outside of stoppages affecting Navy, British or Maritime Commission orders exclusively, were as follows:

1941 Month	Man-days Lost
January	101,540
February	429,879
March	664,519
April 1 through 25	268,269
Total, Jan. 1 through Jan. 25	1,464,207*

(*Not including more than 7 million man-days lost through the soft coal strike.)

Carey Machine Doubles Capacity

Cleveland

• • • **Plant capacity** and working force will be doubled under a $200,000 expansion program announced by J. Fred Connelley, president of the Carey Machine Co., here. Construction of an extension which will add 16,000 sq. ft. is underway. The firm is engaged in machining diesel engine connecting rods for the Navy.

Allegheny Ludlum Earns $2,720,164

• • • **Allegheny Ludlum Steel** Corp. reports consolidated net profit of $2,720,164 for the first quarter of 1941. This compares with a net profit of $1,000,297 for the first quarter of 1940.

Otis Profit $594,183

• • • **Otis Steel Co.,** Cleveland, reports net profit of $594,183 for the first quarter of 1941, equal to 44c. a share on common stock after dividend requirements on preferred stock. Last year the company reported a March quarter deficit of $165,513.

28-day Strike In Soft Coal Mines Is Ended

• • • **Agreement by Southern soft coal operators and John L. Lewis' United Mine Workers union to negotiate regarding elimination of the 40c. wage differential between Northern and Southern mines on Monday ended the 28-day bituminous coal strike. Four hundred thousand miners returned to their jobs April 30. Northern wages have been fixed at $7 for a 7-hr. day, and Southern wages have been set tentatively at $6.60 for 7 hr. Army and Navy witnesses testified before a Senate hearing that the strike, which began April 2, was "jeopardizing the defense program."**

Carnegie-Illinois Lifts Salaries Effective April 1

• • • **Carnegie-Illinois** Steel Corp. has notified salaried employees earning $4,000 or less a year that "an adjustment on an equitable basis" will be made on salaries, effective April 1. Most of 20,000 salaried employees will be affected.

Machine Tool Builders To Discuss Priorities May 5-6

Cleveland

• • • **The 39th spring** convention of the National Machine Tool Builders Association in the Cleveland Hotel here May 5 and 6 will be one of the largest meetings of its kind ever held. Priorities and other matters connected with the defense program will be in the spotlight at the two-day session. A special meeting on depreciation questions will be held Tuesday afternoon.

Imports—February, 1941

(Gross tons)

Pig iron	None
Iron ore	178,491
Canada	6,493
Mexico	698
Cuba	5,700
Chile	165,600
Manganese ore (35% and over)	30,674
Battery grade	2,365
India	1,117
Gold Coast	1,248
Other	28,309
Russia	3,620
Cuba	5,619
Bolivia	15
Brazil	4,608
India	8,646
Philippine Islands	49
Union of South Africa	2,909
Gold Coast	2,843

OPACS Proposes Price Ceiling on Copper, Brass

Washington

• • • **A schedule of suggested** ceiling prices on copper and brass ingot, aimed at establishing an eventual uniform maximum price of 12c. for both primary and secondary copper, has been proposed on a voluntary basis by Price Administrator Leon Henderson. The outgrowth of a recent meeting of the industry with OPACS officials in Washington, the suggested price schedule will be given a trial before resorting to formal price fixing by the government.

The following maximum prices were ordered effective on April 25 on a voluntary basis:

For primary producers currently selling at 12c.—12c.

For all primary producers currently selling at more than 12½c., and all custom smelters—12½c.

For casting copper producers—12¼c.

For 85-5-5-5 ingot—13c. (Other ingots to be priced at the usual differentials.)

Mr. Henderson warned against interpreting the suggested differential between the price for custom copper and brass ingot as final, explaining that the suggested prices will be tried and later changed if found necessary to attain a desirable distribution of available scrap supplies.

McOmber Appointed By OPM

Washington

• • • **M. F. McOmber,** formerly with Jones & Laughlin Steel Corp., the United Alloy Steel Corp., and the Timken Roller Bearing Co., has been appointed Pittsburgh area manager of Defense Contract Service, a branch of OPM's production division.

Flanders Quits OPM Post

• • • **Ralph E. Flanders** has resigned as executive officer of the OPM Tools and Equipment group, to resume his duties as president of the Jones & Lamson Co., Springfield, Vt. The tools and equipment group is headed by Dean Dexter S. Kimball.

• **William Harcourt Lynn** has been appointed export sales manager of the Wickwire Spencer Steel Co., New York. Before joining the Wickwire Spencer company in 1939, Mr. Lynn was for six years general manager of the Meddo Steamship Corp. and was also employed in the shipping and purchasing departments of the International Railways of Central America.

• **J. Louis Reynolds,** vice-president in charge of export sales for the Reynolds Metals Co., Richmond, Va., has been appointed general sales manager of the company with offices in Richmond and New York. Mr. Reynolds has been affiliated with the Reynolds Metals Co. for more than nine years, his first duties having been at the company's Louisville, Ky., plant where he was assigned to the hand pouring of lead in the cast house.

• **R. L. Hamilton,** sales manager of the Dumore Co., Racine, Wis., since 1938, has been elected vice-president. Mr. Hamilton joined the Dumore Co. in 1934 and was its advertising manager from 1935 to 1937.

• **Basil T. Horsfield,** manager of the aluminum production division of the Reynolds Metals Co., Richmond, Va., has been elected a director of the company. A graduate of the University of North Carolina, Mr. Horsfield was formerly chief chemist for the Tennessee Chemical Co., Nashville, Tenn.; manager of the electrothermal division of the Aluminum Co. of America, and more recently manager of Orefraction, Inc., Pittsburgh, a subsidiary of the Edwin L. Wiegand Mfg. Co.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **Joseph J. Strachan** has been appointed assistant to the president of the Carnegie-Illinois Steel Corp., Pittsburgh. He formerly was assistant chief engineer of the Pittsburgh district. Mr. Strachan, a graduate of the Massachusetts Institute of Technology in 1913, was employed in railroad, waterfront and industrial design and construction with the Westinghouse Electric & Mfg. Co., Church Kerr & Co., and General Chemical Co. while attending M.I.T. and for six subsequent years. He was public works officer of the Boston Navy Yard from 1917 to 1919 when he returned to the General Chemical Co. as superintendent of its Hudson River works in New York. For the next five years he was job manager for Sanderson & Porter, New York. Mr. Strachan joined Congoleum-Nairn, Inc., as assistant to the operating vice-president in 1929 and later became assistant to the first vice-president and manager of planning. He joined Carnegie-Illinois as assistant chief engineer, Pittsburgh district, April 1, 1940.

• **Wallace H. Anderson** and **Polly Fisher** have been appointed, respectively, director of personnel and assistant to the superintendent of industrial relations at the South Works, Carnegie-Illinois Steel Corp. Mr. Anderson has been employed at South Works continuously since 1917, beginning as a clerk in the auditing department. From 1937 until receiving his latest appointment he held the job to which Polly Fisher has just been appointed. Miss Fisher will be in charge of welfare activities.

• **Paul T. Skove** of the Perfection Stove Co., Cleveland, has been elected president of the Cleveland Purchasing Agents' Association. Other new officers include **Harry Markle,** Harris - Seybold - Potter Co., first vice-president; **W. F. Avery** of Elwell-Parker Electric Co., second vice-president, and **J. R. Stevens,** Harshaw Chemical Co., secretary-treasurer.

• **N. Rollason,** a director of the United Steel Companies, England, has been appointed managing director, succeeding the late Charles J. Walsh. **R. Summers** and **A. Macdiarmid** have also joined the United Steel board.

• **Samuel S. Bruce, Jr.,** has been appointed sales representative of the Duff-Norton Mfg. Co., with headquarters at the company's general offices in Pittsburgh.

• **George W. Land** has been named a research engineer on the

WILLIAM HARCOURT LYNN, export sales manager of the Wickwire-Spencer Steel Co., New York.

J. LOUIS REYNOLDS, vice-president and general sales manager, Reynolds Metals Co., Richmond, Va.

technical staff of Battelle Memorial Institute, Columbus, Ohio. He is studying methods of treatment of coal to render it dustless and will be assigned to other investigations in the fuels research division. Mr. Land was formerly a member of the research staff of the Illinois State Geological Survey.

• **M. D. Galbreath,** formerly treasurer of the Marr-Galbreath Machinery Co., Pittsburgh, which discontinued business on April 30, has set up offices as the Galbreath Machinery Co., 306 Empire Building, Pittsburgh.

• **James D. Milne,** employee of the Pittsfield, Mass., works of the General Electric Co. for 29 years, has been made manager of the Fort Wayne division of the company's plastics department. He will be in charge of engineering and manufacturing.

• **George Gund** was elected a director of Cliffs Corp., Cleveland, filling the position of Charles S. Wachner who declined re-election. At the same time the corporation, which is a holding company for common stock of Cleveland-Cliffs Iron Co., announced that in January, **G. M. Gillies, Jr.,** executive vice-president of Adams Express Co., was elected to take the place of the late Steele Mitchell.

• **Allan A. Lubitz,** president of the American Firstoline Corp., Long Island City, N. Y., has taken over the general sales management of the domestic and export markets for the Gulton Metal Refining & Chemical Corp.

• **William S. Newell,** president of the Bath Iron Works Corp., Bath, Me,. has been made a director of the Maine Central Railroad.

• **R. A. Vogel,** has been transferred from the Cadillac division of General Motors to the general purchasing division of General Motors Corp. as assistant to **Charles Miller.** He is succeeded at Cadillac by **H. F. Siewert** who becomes assistant to **Dan P. Hulgrave,** who is in charge of purchasing. Other changes include shifts in the responsibility of **R. G. Goodwillie** who takes over Mr. Siewert's former duties, **Frank Millington** who takes over Mr. Goodwillie's duties and **J. C. Wittenberg** who takes over the duties formerly carried out by Mr. Millington.

• **Donald J. Reese** will receive the J. H. Whiting gold medal of the American Foundrymen's Association on May 14 at the association's 45th convention in New York. This medal is awarded for outstanding contributions to the industry. Mr. Reese's work in improvement of cupola melting methods won the award for him, which will be presented by Gen. T. S. Hammond, president of the Whiting Corp., Harvey, Ill. Reese was formerly chairman of the Chicago chapter of the association and former president of the Chicago Foundrymen's Club.

• **Harlow Bradley** has been appointed supervisor of foreign dealers for Allis-Chalmers Mfg. Co. His headquarters will be in Milwaukee. Mr. Bradley has had wide experience abroad in sales engineering work, beginning in 1920 when he was sent to France as sales engineer of the company's Paris office. In 1929 he was appointed European manager for the company's tractor division, in charge of tractor sales in Europe and North Africa. Mr. Bradley returned to the United States during the summer of 1936 and shortly thereafter, was assigned to the export division of Allis-Chalmers New York office which handles much of the company's export business. He has been identified with regular and special phases of this work ever since.

• **Lieut. Comm. Edwin H. Price,** Los Angeles representative of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has obtained a leave of absence from the company to serve as assistant supervisor of shipbuilding at the Union Iron Works plant of the Bethlehem Shipbuilding Corp. at San Francisco.

Obituary

• **Ernest B. Neal,** vice-president of the Kinney Mfg. Co., died April 18 in Quincy, Mass. Mr. Neal was born in Gardiner, Me., 77 years ago. He had served as president of the Hydraulic Institute of the United States, Boston Metal Trades Association, and Employers' Association of Eastern Mass.

• **Charles C. Durr,** associated with the Rundle-Spence Mfg. Co., Milwaukee, until his retirement several years ago, died April 15 at his home in Milwaukee. He began his business career in the lumber business established by his father and later was associated with the United States Gypsum Co.

• **Fred C. Norton,** aged 71 years, internationally known designing and special engineer for Youngstown Sheet & Tube Co. for 13 years, died in Youngstown April 19 following a heart attack. His career included designing of the first equipment for producing helium in large quantities, steam piping used for the Chicago World's Fair in 1893, the first gas engines for the William Tod Co. of Youngstown, steam turbines for General Electric Co. at Lynn, Mass., and other achievements.

• **Albert O. Peech,** president of United Steel Companies, England, and for eight years chairman of the companies, died recently in England, aged 68 years. Originally Mr. Peech had been one of the proprietors of the family steel business, Steel, Peech & Tozer, which became the parent of the United Steel combine, with the late Henry Steel as its first chairman. Mr. Peech was an ex-president of the British Iron and Steel Federation, chairman of Templeborough Rolling Mills, and a director of the Appleby-Frodingham Iron & Steel Co.

• **Frederick Mundt,** president of Charles Mundt & Sons Co., Jersey City, manufacturer of perforated metal products, died April 26. He was 55 years old. When he became president of the company in 1926, Mr. Mundt was the fifth member of his family to head the concern, succeeding his father, the late Charles Mundt, and three brothers, Charles, Otto and William Mundt.

• **Robert Evans Springer,** aged 52 years, assistant treasurer of the Colson Co., Elyria, Ohio, manufacturer of bicycles and other metal products, died April 23.

Pig Iron Production in 1940 Second Highest on Record

Source: American Iron & Steel Institute, In Net Tons

PRODUCTION OF PIG IRON AND FERRO-ALLOYS

	1936	1937	1938	1939	1940
PIG IRON:					
Pennsylvania	10,195,220	12,735,786	5,416,285	9,809,487	14,287,826
Ohio	8,071,454	8,852,417	4,715,776	8,033,411	9,969,704
Indiana, Mich.	4,668,495	5,288,994	2,628,993	4,786,803	6,687,707
Md., West Va., Ky., Tenn.	2,354,359	2,835,232	2,030,954	3,116,744	3,575,981
Illinois	3,267,058	3,837,250	1,855,382	2,968,606	4,047,376
Alabama	2,237,997	2,890,355	2,266,060	2,935,685	3,418,895
Mass., New York	2,486,984	3,184,480	1,459,603	2,422,844	3,113,002
Minn., Iowa, Col., Utah	560,965	840,633	398,545	735,102	971,175
Total	33,842,532	40,465,147	20,771,598	34,808,682	46,071,666
FERRO-ALLOYS:					
Pennsylvania	370,119	489,793	184,687	309,543	515,263
Ohio, Iowa, Col.	183,874	193,064	171,078	239,197	345,210
New York, N. J.	272,357	290,733	213,282	191,802	323,467
Va., West Va., Ala., Tenn.	83,807	143 813	119,519	127,873	142,923
Total	910,157	1,117,403	688,566	868,415	1,326,863
Grand total	34,752,689	41,582,550	21.460,164	35,677,097	47,398,529

PIG IRON MADE FOR SALE IN 1940

States	Basic	Bess. & low-phos.	Foundry	All Other	Total
Massachusetts, New York	118,786	207,513	276,290	475,916	1,078,505
Pennsylvania	437,295	430,572	184,746	218,843	1,271,456
Md., W. Va., Ala., Tenn.	151,522	2,591	1,196,897	.....	1,351,010
Ohio	343,819	146,796	190,081	539,415	1,220,111
Indiana, Illinois	195,618	15,722	125,802	500,782	837,924
Mich., Minn., Ia., Col., Utah	29,611	.....	119,791	40,762	190,164
Total	1,276,651	803,194	2,093,607	1,775,718	5,949,170

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS

States	Blast furnaces (a)				Production		
	In blast June 30, 1940	Dec. 31, 1940					
		In	Out	Total	First 6 months 1940	Second 6 months 1940	Total 1940
Mass.	0	1	0	1	1,293,618	1,819,384	3,113,002
New York	11	13	1	14			
Penna.	55	61	9	70	6,448,392	7,839,434	14,287,826
Maryland	6	6	0	6	1,743,147	1,832,834	3,575,981
West Va.	3	3	0	3			
Kentucky	2	2	0	2			
Tennessee	1	1	0	1			
Alabama	15	17	1	18	1,584,935	1,833,960	3,418,895
Ohio	37	44	2	46	4,269,739	5,699,965	9,969,704
Illinois	11	15	8	23	1,687,167	2,360,209	4,047,376
Indiana	16	18	1	19	3,062,445	3,625,262	6,687,707
Michigan	8	8	0	8			
Minnesota	2	2	0	2			
Iowa	0	0	0	0	467,406	503,769	971,175
Colorado	2	3	0	3			
Utah	1	1	0	1			
TOTALS:							
Pig iron	170	195	22	217	20,556,849	25,514,817	46,071,666
Ferro-alloys- Blast furnaces	14	11	3	14	494,567	412,858	907,425
Electric furnaces	....	....	....	....	186,958	232,480	419,438
Grand total	184	206	25	231	21,238,374	26,160,155	47,398,529

(a) Completed and rebuilding blast furnaces.

HALF-YEARLY PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

BASIC PIG IRON

States	First 6 months 1940	Second 6 months 1940	Total 1940
Massachusetts, New York	834,839	1,145,289	1,980,128
Pennsylvania	4,538,815	5,469,590	10,008,405
Maryland, West Virginia, Ky., Ala.	2,570,411	2,751,789	5,322,200
Ohio	3,018,345	3,679,745	6,698,090
Indiana, Illinois	3,432,332	4,476,212	7,908,544
Michigan, Minnesota, Colorado, Utah	1,033,890	1,036,477	2,070,367
Total	15,428,632	18,559,102	33,987,734

BESSEMER AND LOW-PHOSPHORUS PIG IRON

Pennsylvania	1,644,628	2,203,748	3,848,376
Mass., New York, Md., West Va., Ala.	325,765	476,445	802,210
Ohio	961,735	1,548,474	2,510,209
Indiana, Illinois	263,427	411,054	674,481
Total	3,195,555	4,639,721	7,835,276
Total Bessemer	3,035,114	4,351,206	7,386,320
Total Low-Phosphorus	160,441	288,515	448,956

FOUNDRY PIG IRON

Massachusetts, New York, Penna.	254,117	220,849	474,966
Kentucky, Tenn., Ala.	557,043	680,369	1,237,412
Ohio	80,380	121,795	202,175
Indiana, Ill., Mich., Minn., Col., Utah	156,210	221,412	377,622
Total	1,047,750	1,244,425	2,292,175

MALLEABLE PIG IRON

Massachusetts, New York, Penna.	264,808	354,421	619,229
Ohio	204,657	342,170	546,827
Indiana, Illinois, Minnesota	327,181	339,164	666,345
Total	796,646	1,035,755	1,832,401

FERRO-ALLOYS BY KINDS

Ferro-manganese	281,141	228,935	510,076
Spiegeleisen	129,009	107,811	236,820
Ferro-Silicon	236,146	262,686	498,832
Other ferro-alloys	35,229	45,906	81,135
Total	681,525	645,338	1,326,863

PRODUCTION OF PIG IRON AND FERRO-ALLOYS IN 1940

(For sale and for maker's use)

	For sale	For maker's use	Total
PIG IRON:			
Basic	1,276,651	32,711,083	33,987,734
Bessemer and low-phosphorus	803,194	7,032,082	7,835,276
Foundry	2,093,607	198,568	2,292,175
Malleable	1,688,038	144,363	1,832,401
Forge or mill	3,590	.....	3,590
White and mottled, direct castings, etc.	84,090	36,400	120,490
Total	5,949,170	40,122,496	46,071,666
FERRO-ALLOYS:			
Ferro-manganese and spiegel	312,485	434,411	746,896
Ferro-silicon	494,677	4,155	498,832
Other ferro-alloys	81,135	.....	81,135
Total	888,297	438,566	1,326,863
Grand total	6,837,467	40,561,062	47,398,529

Metal Working Activity

. . . Latest Data Assembled by The Iron Age
From Recognized Sources. In Net Tons.

	Feb. 1941	Jan. 1941	Feb. 1940	12 Months 1940	12 Months 1939
Steel Ingots:					
Monthly output[a]	6 250,413	6,943,084	4,527,141	66,993,219	52,798,714
Average weekly output[a]	1,562,603	1,567,288	1,093,512	1,281,431	1,012,634
Per cent of capacity[a]	96.8	97.1	70.0	82.1	64.7
Pig Iron:					
Monthly output[b]	4,197,872	4,663,695	3,311,480	46,948,906	35,317,374
Raw Materials:					
Coke output[c]	4,998,491	5,446,989	4,172,042	56,747,585	44,425,123
Lake ore consumed[d]	6,353,946	7,090,740	4,750,860	69,917,472	49,684,644
Scrap iron consumed	4,673,000	4,794,000	3,420,000	46,689,000	39,207,000
Castings:					
Malleable, orders[e]	76,055	81,089	34,901	571,929	489,482
Steel, orders[e]	105,125	110,579	40,913	816,919	685,074
Finished Steel:					
Trackwork shipments[a]	7,973	6,835	6,898	79,539	68,663
Fabricated shape orders[f]	159,815	266,594	98,882	1,748,144	1,305,049
U. S. Steel Corp. shipments[g]	1,548,451	1,682,454	1,009,256	14,976,110	11,707,251
Fabricated Products:					
Automobile production[h]	485,523	500,931	404,032	4,469,354	3,577,292
Steel furniture shipments[e], value	$3,368,019	$3,152,013	$2,263,969	$29,759,591	$22,609,168
Steel boiler orders[e] (sq. ft.)	1,543,821	2,210,047	558,108	17,233,295	11,098,316
Locomotives ordered[i]	127	78	13	677	415
Freight cars ordered[i]	5,645	14,118	2,748	64,871	56,915
Foundry equipment index[k]	281.1	285.3	135.7	183.7†	*
Gear sales index	262	259	116	155†	103†
Non-Ferrous Metals: (U. S. only)					
Lead shipments[l]	54,852	55,707	39,176	603,143	555,074
Lead stocks[l]	46,604	47,248	72,658	.....	.....
Zinc shipments[m]	59,220	63,272	51,050	696,497	598,972
Zinc stocks[m]	4,962	8,768	65,869	.....	.....
Tin deliveries[n]	13,658	14,291	7,392	129,357	80,523
Refined copper deliveries[o]	112,808	119,736	63,215	1,001,886	814,407
Refined copper stocks[o]	97,689	116,854	145,393	.....	.....
Exports:					
Total iron and steel[p]	672,269	782,715	751,857	11,881,663	6,805,600
All rolled and finished steel[p]	323,338	316,493	353,095	4,590,734	2,109,527
Semi-finished steel[p]	199,531	312,432	95,061	3,310,718	368,360
Scrap[p]	83,303	50,462	261,714	3,161,859	3,977,780
Imports:					
Total iron and steel[p]	892	474	7,549	64,179	352,980
Pig iron[p]	.....	.....	2,276	11,471	43,223
All rolled and finished steel[p]	607	342	1,568	14,830	175,512

Sources of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age*; [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

* Not available. † Monthly averages.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Apr. 29, 1941	Apr. 22, 1941	Apr. 1, 1941	Apr. 30, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	1.90
Cold rolled sheets	3.05	3.05	3.05	2.85
Galvan. sheets (24 ga.)	3.50	3.50	3.50	3.30
Hot rolled strip	2.10	2.10	2.10	1.90
Cold rolled strip	2.80	2.80	2.80	2.60
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	Apr. 29, 1941	Apr. 22, 1941	Apr. 1, 1941	Apr. 30, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$21.00	$16.75
Heavy melt'g steel, Phila.	18.75	18.75	20.00	16.75
Heavy melt'g steel, Ch'go	18.75	18.75	19.75	15.625
Carwheels, Chicago			20.25	17.75
Carwheels, Philadelphia			23.00	20.25
No. 1 cast, Pittsburgh	23.25	23.25	23.25	17.75
No. 1 cast, Philadelphia	24.00	24.00	25.75	20.25
No. 1 cast, Ch'go	*22.60	*22.60	21.25	15.75

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$5.625	$5.625	$5.625	$4.00
Foundry coke, prompt	6.25	6.25	6.25	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	*51.75*	52.50	51.75	47.25
Zinc, East St. Louis	7.25	7.25	7.25	5.75
Lead St. Louis	5.70	5.70	5.70	4.95
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 121-130 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
April 29, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$20.25 a Gross Ton
One year ago	2.211c. a Lb.	$22.61 a Gross Ton	$16.38 a Gross Ton

	High	Low	High	Low	High	Low
1941			$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.261c., Jan. 2	2.211c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Coal strike a serious setback to national defense . . . Pig iron and steel production will not recover for at least two weeks . . . Two small mills appeal for exemption from steel price ceiling . . . Ship and railroad tonnages complicate steel supply situation.

LOSS of production of coal, coke, pig iron and steel, caused by the prolonged strike of soft coal miners, is the most severe setback the national defense program has thus far suffered from work stoppages.

The loss cannot be measured by the decline of a few hundred thousand tons of ingots which will be shown by the April figures as compared with those of March. There has been an even greater loss in pig iron production, which is irreparable, and a still further loss, which cannot be shown in figures, caused by depletion of mill stocks of coal, coke, pig iron and scrap. In the latter two items particularly there was already a shortage.

To keep finishing mills going at as high a rate as possible, steel plants have drawn heavily on their stocks of cold ingots, slabs, billets and sheet bars. These are stocks that are kept in reserve so that finishing mill operations will not be interrupted when steel furnaces are out for repairs. The replacing of these stocks will be almost impossible for many months to come owing to the need for every ton of steel that furnaces can turn out.

Within another week or two the coal strike would have had devastating effects. As it is, there will be a slowing up of deliveries of finished steel and increased tightness in supplies of pig iron and scrap. The fact that ingot output has not dropped lower, being estimated at 94 per cent this week, has been largely due to larger use of scrap. Ingot output may improve somewhat next week, but it will probably take two weeks or longer to recover to the 100 per cent rate of March. Beehive coke production, on which many blast furnaces depend, will not begin for a week or 10 days because most of the ovens are cold.

THE Youngstown district has suffered the most severely from the coke shortage, the ingot rate in that district having dropped 15 points to 84 per cent. The Cleveland-Lorain district has lost five points to 92 per cent, the Pittsburgh district, three points to 92 per cent, and Southern Ohio is off two points to 101.5 per cent.

This vital loss of production has occurred during one of the most crucial periods of the war and also at a time when scarcity of steel has become more serious than at any time since our defense program was started. It is significant that most of the steel which it was hoped would be saved in a year by a 20 per cent cut in automobile production will have been lost before the industry has fully recovered from the effects of the strike.

During the past month orders have been pouring in to most of the mills at a rate in excess of record-breaking March; this despite the fact that some companies can book no additional orders in many products for shipment this year. An increasing number of orders is being returned to the senders with the explanation that they cannot be entered because of the sold-up situation. Galvanized sheets are almost impossible to obtain because of the zinc shortage.

AS the steel situation becomes tighter there are renewed rumblings in Washington of an agitation for greatly increased steel capacity, some of the New Deal expansionists talking in terms of as much as 30,000,000 tons annually. A forerunner of this projected program is the Pacific Coast plant recently proposed, which if it is to be built, probably would be financed by the Defense Plant Corp.

Major steel companies have taken no formal steps toward seeking relief from the price ceiling order. As the Price Administrator wants "facts, not guesses," probably none of them will do so until results of operations under the new wage scale are clearly discernible. Two or three of the smaller companies have made appeals, however. Two of them do not ask for relief but for exemption from the price ceiling on the ground that their "regular" prices for some time have been above the general market level. This poses the problem of whether a dual system of prices will be permitted or whether the Washington authorities are ready to take over the operation of steel plants if their owners are forced to shut down because of insufficient returns. Some modifications of the scrap price schedule are expected this week.

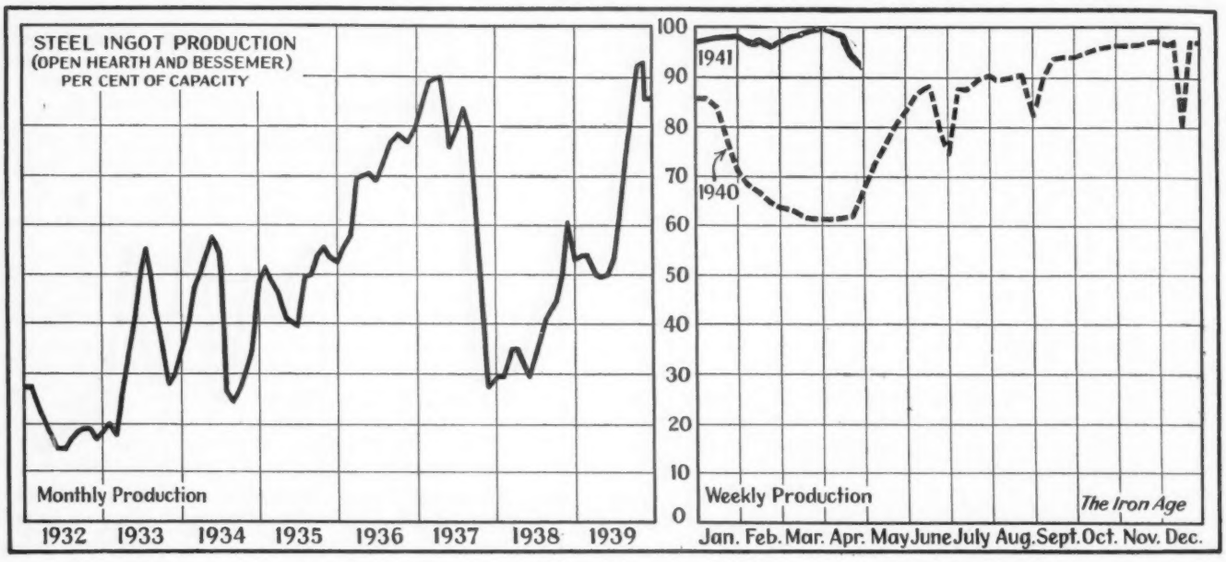
An increasing number of priority orders greatly complicate the situation for the steel companies. About 800,000 tons of plates and shapes have been allocated for 212 additional merchant ships recently awarded. Much of this plant tonnage will be rolled on continuous sheet-strip mills, thereby displacing considerable sheet and strip tonnage. Heavy railroad buying of cars has created a serious problem for car builders in obtaining the steel. Railroads have been urged to place new rail orders well in advance of the regular buying time, which would be next fall, and hence a million tons or so may be ordered within the next 60 or 90 days.

The Industrial Pace . . .

A DECLINE in the heavy construction component, curtailment of steel production because of coke shortages, and a slight reduction of activity at Pittsburgh lowered THE IRON AGE index of capital goods activity fractionally in the past week to 102.9, as compared with 103.7 in the previous week, 119.0 a month ago, and 73.3 in the corresponding week of 1940. The automobile series rose 6.7 points when assemblies increased to 108,165 from 99,945 two weeks ago. Lumber carloadings were up to 72.5, as compared with 70.4 a month ago, and 56.9 in the comparable week of 1929.

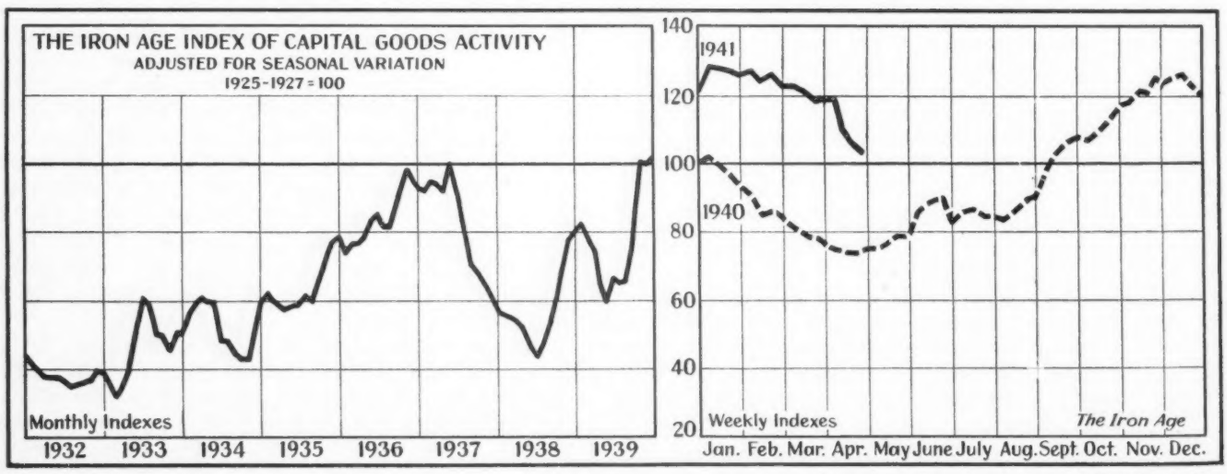
CONSUMPTION of iron ore in March rose to a new high of 6,411,581 gross tons, an increase of 13 per cent over February, and 57 per cent above March, 1940. Production of by-product and beehive coke increased 12 per cent over February, and was 31 per cent over March, 1940. April will show a sharp decline because of work stoppages in bituminous coal production. Estimated average weekly carloadings in April, 690,620, are off 10 per cent from the March average of 763,584, but are 11 per cent above average loadings in April, 1940, of 623,592 cars.

Steel Production is Further Reduced to 94%


STEEL INGOT PRODUCTION
(OPEN HEARTH AND BESSEMER)
PER CENT OF CAPACITY
Monthly Production
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Production
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
100 90 80 70 60 50 40 30 20 10 0

District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week ..	92.0	96.0	84.0	96.0	92.0	104.5	85.0	101.0	95.0	101.5	102.5	111.0	101.5	94.0
	Previous Week..	95.0	96.0	99.0	96.0	97.0	104.5	85.0	97.5	95.0	103.5	102.5	111.0	95.5	96.0

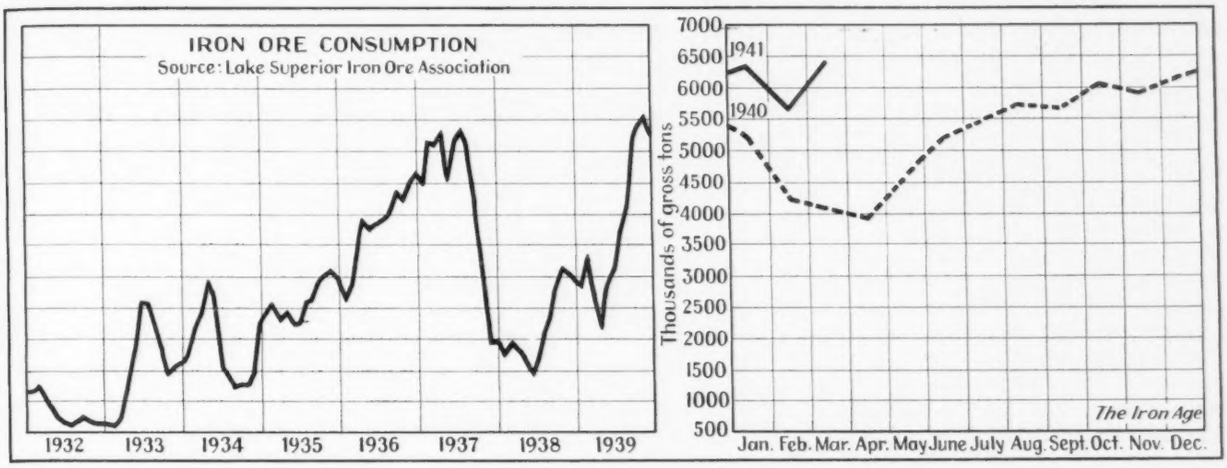
Capital Goods Index 40% Above 1940


THE IRON AGE INDEX OF CAPITAL GOODS ACTIVITY
ADJUSTED FOR SEASONAL VARIATION
1925-1927 = 100
Monthly Indexes
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Indexes
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
140 120 100 80 60 40 20

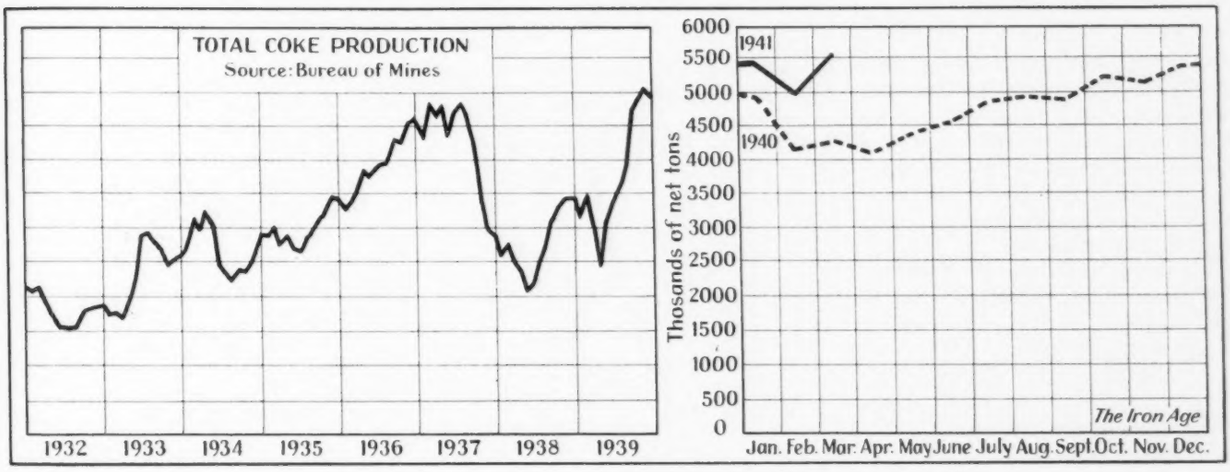
Component	Week Ended	Apr. 26	Apr. 19	Mar. 29	Apr. 27 1940	Apr. 27 1929
Steel ingot production[1]		127.5	130.8	132.8	79.7	131.0
Automobile production[2]		87.7	81.0	110.2	82.3	127.3
Construction contracts[3]		132.2	141.2	154.9	68.0	130.9
Forest products carloadings[4]		72.5	69.9	70.4	56.9	125.0
Pittsburgh output and shipments[5]		94.5	95.7	126.9	79.5	125.1
COMBINED INDEX		102.9	103.7	119.0	73.3	127.9

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended April 19. Other indexes cover week of April 26.

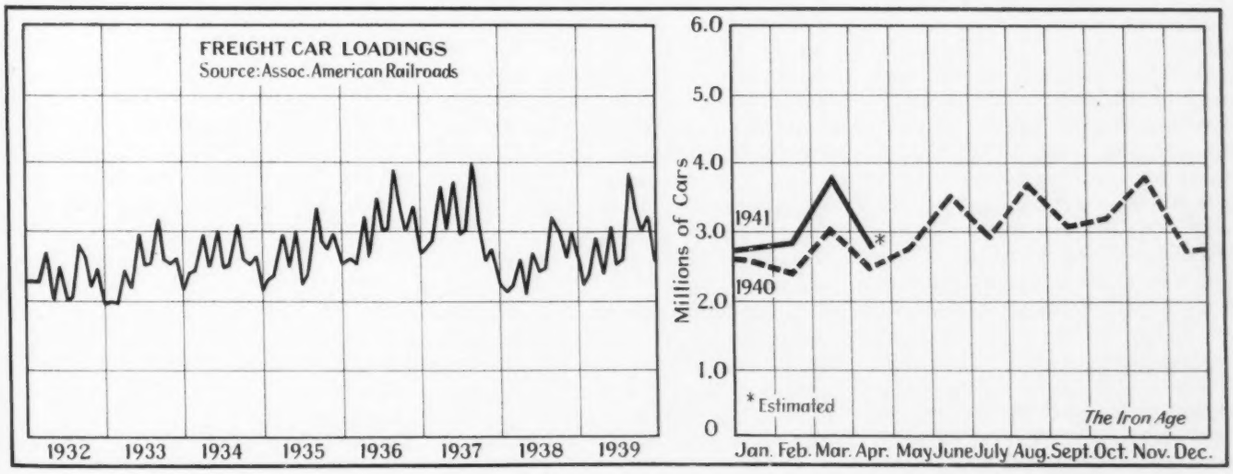
Ore Consumption Sets New Record


IRON ORE CONSUMPTION
Source: Lake Superior Iron Ore Association
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of gross tons
7000 6500 6000 5500 5000 4500 4000 3500 3000 2500 2000 1500 1000 500
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

March Coke Production Rises 12%


TOTAL COKE PRODUCTION
Source: Bureau of Mines
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of net tons
6000 5500 5000 4500 4000 3500 3000 2500 2000 1500 1000 500 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

April Freight Movement Declines


FREIGHT CAR LOADINGS
Source: Assoc. American Railroads
1932 1933 1934 1935 1936 1937 1938 1939
Millions of Cars
6.0 5.0 4.0 3.0 2.0 1.0 0
1941
1940
* Estimated
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

Prices

. . . Smaller companies take their case to price administration

At least two, and possibly three of the smaller steel companies have made appeals to the Office of Price Administration and Civilian Supply in Washington for exemption or relief from the provisions of the steel price ceiling. The first to apply was the Phoenix Iron Co., Phoenixville, Pa., which makes structural shapes only. This case was immediately investigated by representatives of the division, who visited Phoenixville. The second to apply was the Central Iron & Steel Co., Harrisburg, Pa., makers of plates. It is also reported, though not officially confirmed in Washington, that a third applicant is the Andrews Steel Co., Newport, Ky.

The appeals of Phoenix and Central involve almost identical situations. These companies are not asking for relief, but for exemption from the price ceiling because they have for some time past been quoting higher prices than other mills. They contend that these have been their "regular" prices and therefore are not premiums in the usual sense of that word. Central has granted a wage increase of 10c. per hr., but Phoenix has not.

A problem that may be difficult to solve has been presented to the Price Administration. Both companies have been quoting prices several dollars a ton above the recognized market quotation of 2.10c. basing point for their products. The problem is: shall a dual system of prices be permitted, or will the companies be obliged to lower their prices to a level which might force them to shut down their plants? Thus it becomes a problem both of prices and production. As every ton of steel that can be made is urgently needed, the latter phase of the problem becomes of great moment to the Office of Production Management. Whether the shutting down of a steel plant would result in the government taking over is a question that also must be decided in Washington.

Other price problems have arisen, particularly in connection with price changes that occurred subsequent to March 31. One of these raised prices of galvanized pipe $6 a ton, a step that was dictated by the scarcity and high cost of spelter. Another raised the extra on galvanized wire nails and a third revised extras on commodity cold rolled strip steel. Most of the pipe makers, in filing their prices with the Office of Price Administration, have filed the advanced prices with an explanation. No decision has been announced as to whether these higher prices can be continued in effect.

All-rail shipment of plates, shapes and other products to Pacific Coast and Gulf shipyards by interior mills has raised another question which has not been settled. Some of the mills contend that they should be permitted to sell on an f.o.b. mill basis. Some steel has been shipped to the Coast on a Chicago base, taking land grant freight rates.

Leading mills, it is reported, will no longer sell steel for railroad equipment on an identified project basis—that is, price protection for the life of the job. Recent quotations have been on the basis of price in effect at time of shipment of the steel.

New Business

. . . Coal strike effects will further disrupt mill shipments

The damaging effects of the coal shortage will be felt for a long time to come and may never be fully repaired. This is because mill inventories of cold steel are being eaten into at a fast rate. Even after full resumption of mines, coke ovens, blast furnaces and bessemers, months will be required before inventories of raw materials and semi-finished steel rise to a comfortable point.

Meanwhile, direct and indirect defense business held by steel mills is growing larger. Large blocks of semi-finished and finished steel tonnage are overhanging the market and emphasis on finished steel is more pronounced.

PITTSBURGH reports April bookings will be equal to or greater than March business. Deliveries are further extended, promises on some products such as sheets are not only indefinite but first quarter of 1942 is being mentioned. Rolling mill schedules are being continually disrupted by the appearance of rush orders.

Steel orders declined as much as 20 per cent in CHICAGO the past week for no apparently definite reason. Mills there, including those which have not yet been forced to bank blast furnaces, are deeply worried over the coal shortage. Placing of 212 merchant ships last week has made the plate situation even more serious since nearly all producers were forced to take a share.

Orders placed at BIRMINGHAM during April will equal, if not exceed, bookings for the record breaking month of March. Plates and bars are still the big items. Heavy demand for sheets and wire products shows little variation from March purchases.

Peacetime requirements are being sidetracked in increasing volume to make way for defense needs at BUFFALO mills. Sales executives report a larger volume of orders with priority demands are being presented to them for prompt fulfillment with the result that even the district's largest steel mill is "practically out of the market for the rest of the year" so far as accepting requirements for civilian production is concerned.

In Eastern Pennsylvania the volume of new business booked remains very heavy despite the fact that most mills cannot quote delivery on major products for this year.

In his announcement of plans to add 1,250,000 tons annually to Western steel production, Henry J. Kaiser declared that one mill would not book plate orders even for 1942. Another concern quoted December or January delivery. The Kaiser announcement of plans for a new Western mill was regarded by some as a club to enforce more favorable delivery schedule for his shipbuilding projects.

Pig Iron

. . . Loss of production will be felt for some time to come

In relation to what this country is attempting to do—arm itself and help Britain as quickly as possible—the results of the coal strike will be subsequently found to be devastating in terms of pig iron production permanently lost. Some merchant pig iron furnaces have been able to "hobble along" on borrowed coke, but the shutting down of some merchant plants and the loss of pig iron production to some steel companies spells extreme tightness in the merchant pig iron market, according to PITTSBURGH reports. What is true of merchant pig iron production is likewise true of steel making iron and, in turn, raw steel output.

At the start of this week six blast furnaces at YOUNGSTOWN had been forced to suspend production because of lack of coke. Republic Steel Corp. had lost three out of its four stacks at Youngstown, had completely stopped bessemer production and was running its by-product ovens at approximately 25 per cent. Carnegie-Illinois Steel Corp., Sharon Steel Corp., and Shenango Furnace Co., each with one stack shut down, accounted for the remainder of the six stacks. Carnegie-Illinois had banked a furnace at Mingo Junction and National Tube banked one at Lorain. Republic had suspended one at CLEVELAND about a week ago and expected to remove another at CLEVELAND this week. In order to assist the Valley district, Republic was shipping some pig iron from CLEVELAND to the Valley.

Many of the active stacks at YOUNGSTOWN, CLEVELAND and LORAIN were on slow blast to help conserve coke. Scrap and pig iron inventories have been going down rapidly.

Two more furnaces were banked in the CHICAGO district last week by Carnegie-Illinois Steel Corp., making two each at South Works and at Gary.

Despite idleness in Alabama's coal fields at the first of the week, 17 of that district's 18 furnaces were in blast at that time and the eighteenth was scheduled to be back in production the latter part of the week. This furnace, the Tennessee Coal, Iron & Railroad's Co.'s No. 5 furnace at Fairfield works, has been off two months for major repairs.

Semi-Finished Steel

. . . Increasingly tighter supply position indicated

For five months semi-finished demand has been running far ahead of production and shipments. The situation has been found complicated and seriously dislocated because of lost steel production due to the coal strike. Rush orders for government plates are also interfering with production of sheet bars for non-integrated mills. Future events, which will probably be patterned somewhat after those occurring recently, indicate an increasingly tighter position in the semi-finished steel market.

Stocks of slabs, billets, etc., have dwindled rapidly as a result of the coal strike.

Sheets and Strip

. . . Incoming orders are almost double output

Sheet orders are coming in at a rate almost double production, Pittsburgh reports. Some delivery promises are for first quarter 1942, schedules are being interfered with by production of ship plates, sheet tonnage for defense purposes is increasing rapidly, and the commercial sheet and strip backlog is building up to record levels. It is appallingly significant that at least part of the steel tonnage expected to be diverted for national defense purposes by a cut of 20 per cent in automobile production has been dissipated by a loss of steel production owing to the coal strike.

Demand from the truck body field has been impressive at CLEVELAND recently. It is understood purchases of cargo bodies for the British have been heavy.

Galvanized, hot and cold rolled, sheets at CHICAGO are now quoted for second and third quarter 1942 by the biggest producer. Automotive demand has not lessened but much of this steel is on the books and thus subject to recall if necessary.

Some mills have no galvanized sheets to offer and are returning orders.

Reinforcing Steel

. . . Lettings are higher so far in 1941

Awards of 29,535 tons are the highest for any week this year. Outstanding lettings are 6000 tons at St. Louis for the Western Cartridge Co. and McQuary-Norris Co. plants; 5500 tons for a government arsenal at Bynum, Ala.; 5000 tons for a magnesium plant at Permanente, Cal.; 2500 tons for the Union Square Garage, San Francisco; 1500 tons for a du Pont plant at Childersburg, Ala.; 1327 tons at Los Angeles and Wilmington, Cal., for the Los Angeles Department of Water and Power, and 1000 tons for an ammunition loading plant addition at Elwood, Ill.

New reinforcing projects of 9860 tons include 1200 tons at Weldon Springs, Mo., for the Atlas Powder Co.'s TNT and DNT plants; 1000 tons for a housing project in the Roxbury district, Boston; 1000 tons for a housing project in East Boston, and 1000 tons for the Plum Brook ordnance plant at Sandusky, Ohio.

Merchant Bars

. . . Pressure is growing . . . New orders still heavy

New orders are brisk and pressure for speedier shipments is growing week by week, according to CLEVELAND and YOUNGSTOWN producers. Requirements of the government armament program for hot and cold finished bars, particularly small sizes, have been mounting rapidly. A trend toward open hearth analysis for both gun barrel and shell nose work is becoming pronounced.

PITTSBURGH reports no abatement in the influx of bar orders. Deliveries are further extended, rolling schedules are more difficult to set up so as to equitably distribute supplies.

Bar specifications at CHICAGO are still in greater volume than those for any other product. Increasing shell requirements are so great that steel producers there believe that the district will soon have more shells in manufacture than any other. Alloy deliveries were lengthened this week to six or eight months, a jump of three months by one mill.

Structural Steel

. . . 26,000 tons awarded for airplane plant in Texas

Fabricated structural steel awards of 42,550 tons are swelled by 26,000 tons for a plant at Fort Worth, Tex., for the Consolidated Aircraft Corp. Other lettings of size are 1350 tons for a viaduct in New York between East 45th and East 50th Streets; 1300 tons at Cincinnati for an engineering and service annex building for the Cincinnati Milling Machine Co.; 1100 tons for a bag manufacturing plant at Charleston, Ind.; 1000 tons for a storehouse at the reserve base, Philadelphia, for the Navy Department, and 1000 tons additional for a Navy transit shed at San Diego, Cal.

Structural steel projects declined to 11,110 tons from 18,650 tons last week. New inquiries include 1600 tons for the Veterans Memorial Hospital at Hines, Ill.; 1500 tons for a bridge over Berry's Creek, between Rutherford and East Rutherford, N. J., and 1150 tons at Detroit, for the Chrysler Corp., 700 tons for a machine shop addition to the service building and 450 tons for an addition to the press shop.

Warehouse Business

. . . Price ceiling for steel out of stock being considered

Although the order freezing steel prices at the March 31 level did not specifically apply to warehouse distributers, except so far as purchases are concerned, the matter of warehouse prices is being studied by the Office of Price Administration and Civilian Supply in Washington. It would appear likely that action will be deferred so long as warehouses charge only the differentials that have normally applied.

Oddly, the present price situation and the growing scarcity of steel has not entirely cured price cutting on merchant pipe, particularly in the NEW YORK area. Even the warning by mills that pipe may not be available in the future in the quantities which jobbers want has failed to deter some of them from selling at considerably below the established resale prices.

Preliminary estimates of PHILADELPHIA warehouse indicate that April business ran as much as 22 per cent above March. Tightest pinch is in stainless and hot rolled bars. Galvanized sheets are still available in limited lots.

April business is reported by leading BUFFALO warehouse executives as being on a par with March, a record breaking month. Many items still are going out of the warehouses faster than new supplies are coming in, but stocks, generally, are in fair shape. Tight situations have developed in alloy steels (particularly in the 2300 and 3100 series), stainless nickel and heat-treated steels.

Many sizes at BIRMINGHAM are becoming exhausted and mill deliveries are inadequate to supply current demand. Bars, shapes, structurals and plates are at a premium.

Tubular Goods

. . . Demand for pipe of all classes is good

Heavier demand for merchant pipe, much of which stems from national defense requirements, a steady placement of miscellaneous line pipe business, and a potentially greater demand for ail country goods, sums up the pipe market at PITTSBURGH.

With steel furniture makers, most of whom are located near CHICAGO, working at 20 to 40 per cent ahead of last year considerable tonnage is going in that direction. Spurt is due to defense steel furniture demands plus increased domestic orders. Deliveries on regular tubular goods there are still reasonably prompt.

The Bureau of Reclamation has awarded a $128,828 contract to the Laclede Steel Co., St. Louis, for 3,000,000 ft. of 1-in. black steel pipe and 11,000 180-deg., 5 ft. 6 in. bends for the Central Valley project in California.

Bolts, Nuts and Rivets

. . . Makers cutting up steel as fast as it comes in

Production of cap screws at CLEVELAND has fallen lower partly due to a strike at one plant and partly due to temporary delays in getting steel. All bolt and nut plants are cutting up steel just as fast as it comes in and are operating in close dependence on steel mill rollings. Prices continue subject to quick change.

April new business volume at CLEVELAND has been running in excess of the comparable March period. With more fabricated parts being required by the British a pronounced quickening to the export field has been noted. Railroads are in the market heavily. A survey of Eastern carriers indicates much additional business is overhanging the market.

Wire Products

. . . Orders, off slightly, but ahead of shipments

Aggregate order volume at CLEVELAND from April 1 through the 26th was slightly below the comparable March period, but still ahead of production. Lighter export sales and the passing of the seasonal merchant products peak accounted for the decline. Large-scale government nail purchases for cantonments will be resumed by midsummer. Other government projects are affording much tonnage. Cyclone Fence Co. has been awarded fence for the new Plum Brook ordnance plant at Sandusky, Ohio.

PITTSBURGH reports wire production hampered to some extent by lack of steel, occasioned by the coal strike. Incoming business shows little change from a week ago.

Railroad Buying

. . . 3800 freight cars, 12 locomotives, 10,600 tons of rails ordered

Major railroads are seriously studying 1942 rail requirements and it is believed allocations for next year's program may begin within the next 60 days. Railroads want positions on rolling schedules and it would not be surprising to see more than 1,000,000 tons of rails on steel order books long before the usual time. Present orders total some 3800 freight cars with expected allocations ranging up to 7000 units.

Louisville & Nashville has purchased 1000 50-ton hopper and 1000 50-ton box cars, equally divided between Pullman-Standard Car Mfg. Co. and American Car & Foundry Co., and 100 automobile cars from Pullman-Standard.

Norfolk & Western bought 1000

box cars from Ralston Steel Car Co. and 200 from Greenville Steel Car Co.

Canadian Pacific took 250 50-ton twin hoppers from the Magor Car Corp.

American Refrigerator Transit Co. is building at its St. Louis shops 150 refrigerator cars.

Erie shops are constructing 70 cabooses and Ann Arbor's 25 55-ton hopper cars.

Chicago, Milwaukee, St. Paul & Pacific has awarded six 380-hp. diesel-electric switching locomotives to Whitcomb Locomotive Co. and two of 360-hp. to General Electric Co.

Whitcomb Locomotive Co. is building a number of light diesel-electric units: four for Day & Zimmerman, Inc., three for the Houston Shipbuilding Corp. and one for Walsh Construction Co. This company has supplied in the course of the first quarter a total of 29 light engines to industrial concerns.

The Navy has placed an order for one diesel-electric locomotive with General Electric Co., while the government will take bids on a 4-8-2 mountain locomotive for the Alaska Railroad on May 10.

The Portuguese government has bought 19 third class passenger cars from Pullman-Standard Car Export Co. to be used in Mozambique. Illinois Central bought two lightweight dining cars from Pullman-Standard.

Wabash Railway has purchased 5000 tons of 112-lb. rails from Carnegie-Illinois, Inland and Bethlehem.

Carnegie-Illinois Steel Corp. has been awarded 1300 gross tons of 85-lb. Standard Rail, and Bethlehem Steel Co. 1300 tons of the same weight rail for the new Plum Brook ordnance plant at Sandusky, Ohio. Around 2000 tons of relaying rails were reported placed with L. B. Foster of Pittsburgh. Republic Steel Corp. was awarded tie plates and track bolts. The whole project involves around 37½ miles of track.

Coke

. . . Beehive ovens cannot produce for week to 10 days

From one week to 10 days will be required before fresh beehive coke will start moving to blast furnaces from the western Pennsylvania regions. Ovens which are not stone cold will probably be producing in about a week, while those which have been shut down for some time will require slightly longer.

Plates

. . . Allocation of 606,000 tons for new ships creates problems

Allocation of 806,000 tons of steel—606,000 tons of plates and 200,000 tons of shapes—for the 212 merchant ships recently placed has created a number of problems for the mills. Allocation of such large tonnages for defense work has now become an industry matter and mills are obligated to take the tonnage assigned to them whether they desire it or not. Continuous sheet-strip mills which can roll plates will now be forced to roll larger tonnages of plate than their normal quotas provide for.

The question of price has also entered into the matter. Owing to the shortage of ocean bottoms, much of the tonnage for the Pacific Coast will have to go by rail, and mills which are badly situated with respect to such shipments have appealed for relief from the Price Administrator's order which would require that they deliver on the West Coast at the published delivered prices there, as in so doing they would have to absorb so much freight that the net mill prices would be below cost. Northern mills, it is understood, will also have to ship to Gulf ports on a Birmingham base. This price question has not been definitely settled.

Tin Plate

. . . Cold reduction mills at virtual capacity

Incoming specifications continue somewhat above production and shipments and cold reduction tin plate mills remain at virtual capacity this week.

Judge Burnett Leaves C-I

• • • **L. H. Burnett,** senior vice-president, Carnegie Illinois Steel Corp., Pittsburgh, has retired from business upon completion of 40 years' service with U. S. Steel's largest operating subsidiary.

U.S. Steel Quarterly Earnings $36,559,995

• • • **U. S. Steel Corp.** in the first quarter earned $36,559,995 against $32,793,212 in the fourth quarter and $17,113,995 in the first quarter of 1940. First quarter earnings were equal to $3.47 per common share after regular preferred dividend of $1.75 a share. A dividend of $1 a share on the common was declared. Profits in the fourth quarter were equal to $3.04 per common share and in the first quarter of last year to $1.24 a share. It was announced that $5,000,000 has been set aside out of the first quarter income for the contingency reserve to provide for excess profits, if any, during the year.

Shipments of finished steel during the first quarter were 4,951,271 net tons, equal to 100.6 per cent of finishing mill capacity, as compared with 4,542,383 tons in the fourth quarter or 93.3 per cent of finishing mill capacity.

Strike Costs Republic 100,000 Tons of Steel

• • • **Loss of 100,000 tons** of pig iron production and the melting of 20,000 tons of steel scrap above normal consumption are among the coal strike's drastic effects upon Republic Steel Corp., T. M. Girdler, chairman, said here Tuesday.

"Though coal will arrive at the Republic plants within 36 hr. after the end of the first shift at the coal mines and this coal will be charged into by-product coke ovens 20 minutes after its arrival, the 28-day coal strike resulted in a loss of about 100,000 tons of pig iron production on the part of Republic," he said. "This pig iron loss can be translated into a loss of steel ingots on nearly a ton-for-ton basis. Republic's rate of operations had dropped from more than 100 per cent before the strike to approximately 87 per cent today.

G-E Gets $21 Million Navy Job

• • • **The Navy Department** has awarded a cost-plus-fixed fee contract at an estimated cost of $21,216,471 to the General Electric Co., Schenectady, N. Y., for ordnance equipment.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

New Tool Plants Rushed

Cincinnati

Further increase in machine tool output in this area must await the completion of new buildings. Machinery makers have pushed present facilities to the limit in establishing an all-time record in output, but without the new plants only small if any gains would be likely. A half dozen or more projects are in actual execution or nearly so and completion of many of them is expected during the summer and early autumn. New business continues to pour in at capacity breaking volume and manufacturers report that there appears to be more in the offing. Possibility of delivery this year is limited to a small group of tools, the bulk still being subject to promises for next year only.

Ordnance Work Expanding

Cleveland

Market highspots this week include the spending of around $2,700,000 for new equipment by Goodyear Aircraft in Akron; announcement that Parker Appliance Co. will require $1,500,000 in equipment, including some boring and threading machines, and the dispensing of formal orders by numerous companies such as Ohio Crankshaft.

Shell making is coming more and more to the fore. Firestone holds a new negotiated contract for 400,000 cases a month. A very large forging plant is slated to be located in the Dayton area. Jones & Laughlin, Dresser Mfg. Co. and others are tooling up rapidly. Open capacity for producing upset forging equipment will probably be filled soon.

Inquiries for bids have been put out by Washington seeking firms interested in making the shell lathe developed under auspices of the National Machine Tool Builders' Association. Several hundred machines are believed to be involved. Only two companies have been making the lathes so far.

Machine tool shipments during March at $57,400,000 brought the total for the first quarter of 1941 to around $159,500,000. Monthly output is climbing rapidly, and probably the remaining quarters will average higher than first quarter. In March, 1940, shipments totaled only $29,000,000.

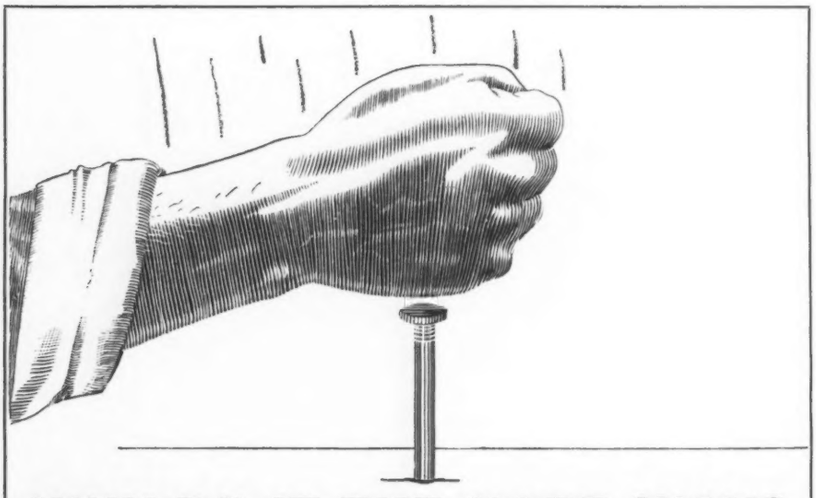
Chicago Orders Still Heavy

Chicago

New machine tool orders continue to flow heavily into this area. Backlogs are heavy despite largest output on record. Some of the manufacturers are not yet getting full production out of plant additions. Influx of new operators is responsible partially since these men have not yet been absorbed to the point where they can match more experienced men. Manufacturers are fully aware of the pressing urgency of speedier deliveries and records are being smashed regularly.

Some manufacturers report that profit is not keeping pace with increased dollar volume. However, this has not been entirely unexpected. Exceptional growth of airplane parts factories in Indiana and Illinois is taking heavy toll of machine tool capacity. With Army Ordnance contracts running larger each week, many defense contractors need more tools than originally planned. Already the Chicago ordnance district is administering more contracts than any other district in the country.

Gisholt Machine Co., Madison, Wis., recently raised wages of 1000 employees.



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The new heat-treating problem you're facing may find its solution right in your own shop, using your present equipment, if you have a good salt bath furnace.

Because salt baths, too, have kept pace with the heat-treating industry's developments, there's hardly a process where the liquid salt bath won't prove more flexible, more sure of uniform results and more economical.

Straight-line production is no problem today to the salt bath. There are now in operation completely mechanized units, where parts are processed through baths on a prearranged automatic time cycle.

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Chicago - PHILADELPHIA - Detroit

Non-Ferrous Metals
. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, April 29—Demand is sustained at a high level. Lead has been particularly active as buyers seek to cover forward needs. Zinc and copper demand is greatly in excess of available supplies. However, buyers are becoming adjusted to this sieuation and the market consequently displays a more orderly aspect despite the heavy activity. Tin eased moderately over the week-end to 51.75c. in sympathy with the recent trend at Singapore. All other non-ferrous prices are unchanged.

In the copper market, mine producers continued routine allocations on the long-unchanged basis of 12c. delivered Connecticut Valley, good tonnages being disposed of during the week. Custom smelters reported a continuation of the light volume of inquiry current in the past several weeks. Export market quotations are largely nominal.

Tin

The market here has been dull in the past week. Consumers, apparently reflecting the heavy arrivals in this country, were not especially eager to enter into new commitments, and the market for both prompt and nearby delivery declined in the period. Prompt Straits declined from 52.375c. a lb. on April 23 to 51.75c. on April 29. This development is in line with a similar price movement at Singapore. Shipments to this country so far in 1941 have totaled 47,000 tons, about 20,000 tons in excess of actual consumption. Bids have been reissued by the Navy Department for 560,000 lb. of grade A tin, delivery within 90 days, on the basis of no arrival —no sale.

Lead

Leading producers opened June books at the beginning of this week, and encountered a very good volume of demand. Not all May requirements have been taken care of as yet, however, estimates running about 85 per cent covered. Total refined lead stocks at the end of March amounted to 45,996 tons, as compared with 46,604 tons in February and 74,692 at the end of March, 1940. March shipments increased to 62,090 tons from 54,859 in February and 46,353 in March of 1940. Heavy secondary production boosted total output to 61,503 tons, as against 54,231 tons in February. Production from domestic ore was off slightly to 46,748 tons from 47,764 tons in the previous month.

Zinc

Estimates made at the meeting of the American Zinc Institute indicate that production in 1941 may run as high as 25 per cent above 1940, with further increases in 1942. Producers have been asked to charge only the usual $2 premium on brass special, instead of $5. The latter price has prevailed on some business since the first of the year. In the regular market business proceeded along routine lines. Several floods in the Tri-State district will set back mine production in some cases as much as two weeks. Initial cuts in output of 1500 to 2500 tons for the week are expected to be revised downward gradually over 60 days. In the regular market business proceeded pretty much as usual. Sales in the past week were 3546 tons. Shipments rose to 5403.5 tons from 4445 tons last week.

(Non-ferrous prices on page 125)

Electrical Firms Lift Wages

• • • **General Electric Co.** and Westinghouse Electric & Mfg. Co. this week increased wages 10c. an hour.

ARE YOU DOING ANY OF THESE Metal-Working OPERATIONS?

if so

CERRO ALLOYS

can save time or improve the quality of work

Securing punch and die parts
Anchoring stationary machine parts
Making engraving machine models
Holding permanent magnets
Making chuck jaws for irregular shapes
Reclaiming cracked dies
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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

Last week representatives of the scrap industry, the steel industry and the foundries presented recommendations to the Office of Price Administration and Civilian Supply for changes in the iron and steel scrap price schedule. Most of these suggested changes are in the nature of modifications of the schedule and are not drastic. However, an important change in the price setup for cast iron scrap has been decided upon and will be announced shortly if it meets with the approval of the division's legal counsel. This change would divorce cast iron scrap prices from the No. 2 foundry pig iron base and would establish ceiling prices on cast grades for each district in line with the method followed in establishing steel scrap prices. There have been many complaints by foundries that the cast scrap setup was unworkable.

One of the serious difficulties concerns the supply of rerolling rails. It is said that some of the rail steel bar mills may be forced to shut down unless supplies of old rails can be found for them. The shortage of rails is due to a number of factors. One is that railroads have not received many shipments this spring against their orders for new rails and consequently have not torn up many old rails. Whenever old rails are available, however, they can be readily sold for relaying at better than scrap prices. The railroads will use them for sidtracks and defense plants are also in need of relayers. Moreover, the price differentials in favor of scrap rails make it possible for the railroads to cut up the old rails into short pieces and get more money for them than if they are sold for rerolling purposes.

Although the ceiling price for No. 1 heavy melting steel in Eastern Pennsylvania is $18.75, the Bethlehem Steel Co. until a few days ago had been offering only $18.25 at Bethlehem and Sparrows Point. This price has been raised temporarily to $18.75 so that a larger flow of scrap could be induced. The scrap trade, it is reported, may apply for a fixed differential at these mills 50c. under the Eastern Pennsylvania ceiling.

Scrap trading is mostly concerned with the cleaning up of old contracts under the deadline which expires May 10. The real test of the fixed price schedule and scrap supply will come after that date.

Pittsburgh

Brokers and dealers are still preeminently engaged in shipping on old orders and working against the May 10 deadline. Transactions under the new price setup have been secondary, and have not involved large tonnages. An increase in direct buying by scrap consumers has been noted which has had the effect of further curtailing brokerage business in this district.

Chicago

Buying and selling is still slow as everyone waits for May 10 to open up the scrap market again. Conversation on the subject of unclassified grades apparently takes up more time than actual transactions. It is impossible to get representative prices on unlisted items for the trade shies away from handling more than is absolutely necessary. Chicago interests are looking hopefully to the solution of cast iron scrap prices since the present method is keeping cast away from Chicago. All principal mills bought last week, and it is reported that the biggest mill took considerable tonnage in the district. Because of the coal strike, some mills are using more than usual amounts of scrap.

Philadelphia

As far as new business goes the market here continues relatively quiet. What business has done so far has been transacted at prescribed prices. Concentration of activity is in the cleaning up of old orders where a large volume has relieved, at least temporarily, some hard-pressed mills, and has allowed some additions to stock piles. One large consumer, however, continues to report difficulty in obtaining enough scrap.

Cleveland

The coal strike has forced heavy withdrawals from stock piles and it is doubtful if inventories will be restored for a long time to come. All interests are continuing their strenuous efforts to clean up old business before the deadline. The proposed change on the cast iron scrap schedule is favored here as a timely solution.

Youngstown

To keep open hearths going here mills have been loading scrap out of their stocks very heavily. Whether inventories can be rebuilt under the present high pressure activity is a question seriously disturbing key officials here. Some say that they will consider themselves lucky if enough material comes through for actual operations.

Buffalo

A few scattered sales have been made here in the past week, largest being about 300 tons of low phos. heavy plate which was sold at $24.25 a ton—the government price for low phos. billet. Otherwise, activity still is primarily in the shipment of old orders. Cast scrap is scarce but other scrap is coming out freely.

St. Louis

New tonnages placed by steel mills in the St. Louis industrial district of items fixed in price by the government are small, and nothing is being sold of items not on that list. Shipments of old orders continue at a lively rate, but offerings of new business are light.

Boston

Steel turnings, bundled skeleton and blast furnace material are going forward to Pennsylvania points on the new price basis, but no heavy melting steel to the Pittsburgh area because the eastern Pennsylvania market is more advantageous to shippers.

San Francisco

The feature of this market is the great scarcity of cast scrap.

Cincinnati

Chief activity in this area continues to be the movement of material on contracts under the May 10 deadline. Even though bought at prices higher than the government's ceiling, users generally are cooperating with dealers to assure completion of these orders by the terminal date. Recently established dealers' buying prices have had no test yet.

Detroit

May automotive scrap accumulations are being sold this week, possibly providing some test of currently quoted prices. Basis for quotation has been modified in some instances with provision being made for bids on the entire month's accumulation or only on the portion that can be shipped before May 10 on old orders. Buying prices are unchanged for the third successive week in this area.

New York

Most transactions are still against old orders, but some new business is being taken at the new ceiling prices. A shortage of scrap at Bethlehem with a resultant abandonment of the 50c. price differential under other Eastern mills has led to a corresponding advance in New York quotations. Cast scrap supply is very tight.

Scrap Prices

Government ceiling prices are given in bold face type; Market quotations as reported by THE IRON AGE are shown in Italics.

Dollars per Gross Ton delivered to Consumers at: →	Pitts-burgh	Chicago	Eastern Pennsyl-vania	Youngs-town	Cleve-land	Buffalo	Bir-ming-ham	St. Louis	New England	Duluth	Pacific Coast	Dealers' buying prices, Dollars f.o.b. cars: Cincinnati	Detroit	New York*	Toronto	Export N. Y.
STEEL GRADES																
No. 1 heavy melting steel	$20.00	$18.75	$18.75	$20.00	$19.50	$19.25	$17.00	$17.50	$15.50	$18.00	$14.50	*$16.00 to $16.50*	*$16.50 to $17.00*	*$15.25 to $15.75*	*$12.50*	*$15.75*
No. 2 heavy melting steel	19.00	*16.75 to 17.75*	17.75	19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*	*15.50 to 16.00*	*14.25 to 14.75*	*10.50*	*14.75*
New black hyd. comp. sheets, factories	20.00	18.75	18.75	20.00	19.50	19.25	17.00	17.50	15.50	18.00	14.50	*16.00 to 16.50*	*16.50 to 17.00*			
No. 1 bundles (from dealers' yards)	19.00	17.75	17.75	19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*				
No. 2 dealers' bundles	18.00	16.75	16.75	18.00	17.50	17.25	15.00	15.50	13.50	16.00	12.00	*14.00 to 14.50*				
Mixed borings and turnings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	9.25	13.50	10.00	*10.00 to 11.00*	*12.00 to 12.50*	*10.75 to 11.25*	*9.50*	
Machine shop turnings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	9.40	13.50	10.00	*10.00 to 11.00*	*11.00 to 11.50*	*10.75 to 11.25*	*9.00*	
Shoveling turnings	16.50	15.25	15.25	16.50	16.00	15.75	13.50	14.00		14.50	11.00	*11.50 to 12.50*	*12.00 to 12.50*			
Heavy steel axle turnings	*19.50*				*18.50*											
Heavy steel forge turnings	*18.50*															
Drop forge flashings					*18.50*	*18.25*							*16.00 to 16.50*		*10.50*	
No. 1 busheling	19.50	18.25	18.25	19.50	19.00	18.75	16.50	17.00	15.00	17.50	14.00	*15.50 to 16.00*	*16.00 to 16.50*		*7.50*	
No. 2 busheling	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	11.00	13.50	10.00	*10.00 to 10.50*	*9.50 to 10.00*			
Uncut structural and plate scrap	19.00	17.75		19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*				
L. phos. billet, bar crops, p'nchgs	25.00	23.75	23.75	25.00	24.50	24.25	22.00	22.50	20.50	23.00	19.50	*20.00 to 20.50*				
Low phos. heavy plate	*24.50 to 25.00*					*24.25*							*19.00 to 19.50*			
RAILROAD GRADES																
No. 1 RR heavy melting steel	$21.00	$19.75	$19.75	$21.00	$20.50	$20.25	$18.00	$18.50	$16.50	$19.00	$15.50	*$18.00 to $18.50*	*$18.85*			
Scrap rails	22.00	20.75	20.75	22.00	21.50	21.25	19.00	19.50	17.50	20.00	16.50	*20.00 to 20.50*	*19.85*	*$17.25 to 17.75*		
Scrap rails 3 ft. and under	24.00	22.75	22.75	24.00	23.50	22.75	21.00	21.50	19.50	22.00	18.50	*22.00 to 22.50*	*21.85*	*19.25 to 19.75*		
Scrap rails 2 ft. and under	24.50	23.25	23.25	24.50	24.00	23.75	21.50	22.00	20.00	22.50	19.00	*22.50 to 23.00*	*22.35*	*19.75 to 20.25*		
Scrap rails 18 in. and under	25.00	23.75	23.75	25.00	24.50	24.25	22.00	22.50	20.50	23.00	19.50	*23.00 to 23.50*	*22.85*	*20.25 to 20.75*		
Rerolling rails	23.50	22.25	22.25	23.50	23.00	22.75	20.50	21.00	19.00	21.50	18.00	*21.50 to 22.00*	*21.35*	*18.75 to 19.25*		
RR couplers and knuckles	*24.50 to 25.00*					*24.25*										
Coil and leaf springs	*25.00 to 25.50*							*22.00 to 22.50*								
Steel wheels	*25.00 to 25.50*															
RR malleable	*24.50 to 25.00*				*23.50*	*24.25*		*20.50 to 21.50*								
Steel axles								*25.50 to 26.00*								
Locomotive tires								*20.00 to 20.50*								
FOUNDRY GRADES																
No. 1 cupola	*$22.55 to $23.94*	$22.60	*$23.50 to $24.50*	*$22.50 to $23.39*	$22.50	*$22.00 to $22.50*	$18.38	$22.50				*$20.00 to $21.00*	*$21.50 to $22.00*	*$21.00*	*$20.00*	
Heavy breakable cast	*21.05 to 22.44*	21.10	*22.34 to 23.03*	*21.00 to 21.89*	21.00	*20.00 to 20.50*		21.00	$18.25			*18.00 to 19.50*	*17.50 to 18.00*	*18.80*	*18.00*	
Stove plate	*17.55 to 18.94*	17.60	*18.84 to 19.53*	*17.50 to 18.39*	17.50	17.00	13.00	17.50	14.50			*14.00 to 15.00*	*15.00 to 15.50*	*17.50*	*16.00*	*$17.50*
Cast iron car wheels	*22.55 to 23.94*											*17.00 to 18.50*				
Grate bars					*17.50*			*$14.50 to $15.00*				*14.00 to 15.00*				
Cast iron borings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	11.00	$13.50	$10.00	*10.00 to 11.00*	*12.00 to 12.50*	10.75	*9.00*	
Cast iron borings (chem.)																
Unprepared yard scrap														*10.00*		

*Brokers' prices for delivery to Eastern Pennsylvania consumers

All consumers' prices subject to 3 per cent broker's commission.

Cincinnati: Loose sheet clippings, *$12.00 to $12.50.* Detroit: Long turnings, *$10.00 to $10.50;* Automotive cast, *$21.50 to $22.00;* Sheet clippings, *$13.00 to $13.50.*

Construction Steel

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings advance to 42,550 tons from 35,800 tons last week; new projects lower at 11,110 tons; plate awards jump to 15,100 tons.

AWARDS

NORTH ATLANTIC STATES

1350 Tons, New York, viaduct, contract No. 39, East 45th Street to East 50th Street, to Bethlehem Steel Co., Bethlehem, Pa.

1000 Tons, Philadelphia, storehouse, reserve base, Navy Department, to Bethlehem Steel Co., Bethlehem, Pa.

850 Tons, Hartford, Conn., State by-pass bridge, to American Bridge Co., Pittsburgh.

825 Tons, Wethersfield, Conn., Jordan Lane bridge, to American Bridge Co., Pittsburgh.

550 Tons, Bound Brook, N. J., buildings Nos. 1, 11 and 41, for Bakelite Corp., to Savary & Glasser Co., Dunellen, N. J.

450 Tons, Queens, N. Y., grade crossing elimination, contract CH-41-1, to Bethlehem Steel Co., Bethlehem, Pa.

350 Tons, Buffalo, Miller Avenue grade crossing elimination, to Bethlehem Steel Co., Buffalo, through Bouley Co., Auburn, N. Y.

260 Tons, Fleetwood, N. Y., bridge over Bronx Parkway, to Jones & Laughlin Steel Service Co., Pittsburgh.

215 Tons, Hagerstown, Md., State highway bridge, to American Bridge Co., Pittsburgh.

THE SOUTH

26,000 Tons, Fort Worth, Tex., Consolidated Aircraft plant, to Bethlehem Steel Co., Bethlehem, Pa., through Austin Co., Cleveland.

725 Tons, Norfolk, Va., supply depot storehouse, to Virginia Bridge Co., Roanoke, Va.

700 Tons, Jacksonville, Fla., two Navy airplane hangars, to Ingalls Iron Works Co., Birmingham.

600 Tons, Laurel, Miss., new plant for Masonite Corp., to Ingalls Iron Works Co., Birmingham.

450 Tons, New Orleans, assembly shop for Louisiana Shipyards, Inc., to Ingalls Iron Works Co., Birmingham.

350 Tons, Bearden, Tenn., 29 transmission towers for TVA, to Lehigh Structural Steel Co., Allentown, Pa.

100 Tons, Jacksonville, Fla., three radio towers for Navy, to Ingalls Iron Works Co., Birmingham.

100 Tons, Banana River, Fla., three radio towers for Navy, to Ingalls Iron Works Co., Birmingham.

CENTRAL STATES

1300 Tons, Cincinnati, engineering and service building annex for Cincinnati Milling Machine Co., to American Bridge Co., Pittsburgh.

1100 Tons, Charlestown, Ind., bag manufacturing building, to International Steel & Iron Co., Evansville, Ind.

900 Tons, Sandusky, Ohio, Plum Brook ordnance plant, to Bethlehem fabricators, Inc., Bethlehem, Pa., through E. B. Badger & Sons Co., Boston, contractor.

600 Tons, St. Paul, Minn., hangar at St. Paul airport, to St. Paul Foundry Co., St. Paul.

400 Tons, Rock Island, Ill., government forge shop, Rock Island Arsenal, to Rock Island Bridge & Iron Works, Rock Island, Ill.

300 Tons, Dearborn, Mich., addition for Universal Products Co., to J. L. Peters Co., Detroit.

250 Tons, Wisconsin Rapids, Wis., tainter gates, to Wisconsin Bridge & Iron Co., Milwaukee.

240 Tons, Canton, Ohio, boiler house for Timken Roller Bearing Co., to Bethlehem Steel Co., Bethlehem, Pa.

200 Tons, Cloquet, Minn., building for Northwest Paper Co., to Worden-Allen Co., Milwaukee.

200 Tons, Ellis, Ill., State bridge, to Hansell-Elcock Co., Chicago.

185 Tons, Lawrenceburg Junction, Ind., State bridge, contract No. 2146, to American Bridge Co., Pittsburgh.

150 Tons, Chicago, State Street bridge, to American Bridge Co., Pittsburgh.

110 Tons, Fort Wayne, Ind., General Electric Co. requirements, to Fort Wayne Structural Steel Co., Fort Wayne, Ind.

WESTERN STATES

1000 Tons, San Diego, Cal., additional tonnage for Navy transit shed, to National Iron Works, San Diego, through Person & Hollingsworth and Mojave Corp., San Diego, contractors.

550 Tons, Los Angeles division, reconstruction, bridge No. A-140, for Atchison, Topeka & Santa Fe Railroad Co., to American Bridge Co., Pittsburgh.

168 Tons, Toppenish, Wash., Dry Creek bridge on State highway 8, to Isaacson Iron Works, Seattle, through Hawkins & Armstrong, Seattle, contractors.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

3300 Tons, Herkimer, N. Y., New York Central grade crossing elimination; Lane Construction Corp., Meriden, Conn., general contractor.

1500 Tons, Rutherford-East Rutherford, N. J., State bridge over Berry's Creek.

500 Tons, Chautauqua County, N. Y., grade crossing elimination; Boyer Construction Co., New York, general contractor.

250 Tons, Syracuse, N. Y., field artillery armory; bids May 8.

330 Tons, Ithaca, N. Y., Fall Creek bridge.

295 Tons, Rifflinburg, Pa., State highway bridge.

210 Tons, Hoboken, N. J., manufacturing building for Sweets Co. of America.

190 Tons, Oneida Castle, N. Y., building for Oneida, Ltd.

150 Tons, Cambridge, Mass., Incurables Unit for Holy Ghost Hospital.

140 Tons, Franklin County, N. Y., highway bridge; bids May 14.

110 Tons, Ithaca, N. Y., East Clinton Street bridge.

110 Tons, Oneida County, N. Y., grade crossing elimination; bids May 14.

THE SOUTH

175 Tons, Clifton Forge, Va., trusses for machine shop for Chesapeake & Ohio Railway.

CENTRAL STATES

1600 Tons, Hines, Ill., additional facilities, Memorial Hospital, for Veterans Administration.

1150 Tons, Detroit, 700 tons for machine shop addition to service building, 450 tons for addition to press shop, both for Chrysler Corp.

950 Tons, Akron, Ohio, Ohio Edison Co.

550 Tons, Wyandotte, Mich., warehouse for Pennsylvania Salt Co.

525 Tons, Wood County, Ohio, Chesapeake & Ohio Railway State grade elimination.

430 Tons, Wayne County, Mich., Highland Park highway bridge.

320 Tons, Scioto County, Ohio, State grade elimination.

220 Tons, Hastings, Minn., landward lock, lock and dam No. 2 for Government.

200 Tons, Cleveland, addition for Cleveland Clinic.

200 Tons, Van Wert, Ohio, building for National Motor Bearing Co.

120 Tons, Wyandotte, Mich., building No. 38-A for Pennsylvania Salt Co.

WESTERN STATES

400 Tons, State of Wyoming, Union Pacific Railroad bridge No. 979.58 over Weber River.

350 Tons, Folger and Opal, Idaho, bridges Nos. 30.27, 32.31 and 28.11 for Union Pacific Railroad.

300 Tons, Fort Louis, Wash., hangar and boiler house for War Department.

260 Tons, Donovan & Moxa, Idaho, bridges Nos. 1.61 and 5.333 for Union Pacific Railroad.

175 Tons, Pueblo, Colo., two State bridges; bids May 7.

145 Tons, Converse County, Wyo., State bridge; bids May 6.

FABRICATED PLATES

AWARDS

13,000 Tons, Lorain, Ohio, ore vessel for Pittsburgh Steamship Co., to Carnegie-Illinois Steel Corp., Pittsburgh, through American Shipbuilding Co.

1740 Tons, Seattle, boilers, to Puget Sound Machinery Depot, Seattle.

200 Tons, Hawaii, tank, to Chicago Bridge & Iron Co., Chicago.

160 Tons, Willowbrook, Staten Island, N. Y., standpipe, to Graver Tank & Mfg. Co., East Chicago, Ind.

PENDING PROJECTS

350 Tons, Redwood City, Cal., storage tank.

SHEET PILING

PENDING PROJECTS

600 Tons, Akron, Ohio, Ohio Edison Co.

Weekly Bookings of Construction Steel

Week Ended ——→	Apr. 29, 1941	Apr. 22, 1941	Apr. 1, 1941	Apr. 30, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	42,550	35,880	47,410	6,700	552,785	239,410
Fabricated plate awards	15,100	1,375	16,150	450	66,380	50,955
Steel sheet piling awards	0	1,080	7,435	1,770	14,510	15,765
Reinforcing bar awards	29,535	14,710	14,960	4,150	238,845	138,030
Total Letting of Construction Steel	87,185	52,965	85,955	13,070	872,520	444,160

Reinforcing Steel

Awards of 29,535 tons; 9,860 tons in new projects.

AWARDS

ATLANTIC STATES

700 Tons, Washington, Statler Corp. hotel building, to Bethlehem Steel Co., Bethlehem, Pa.; John W. Harris, associate contractor.

600 Tons, South Boston, quay wall extension, to Carnegie-Illinois Steel Corp., Pittsburgh, and Bethlehem Steel Co., Bethlehem, Pa., jointly through Merritt-Chapman & Scott, contractors.

350 Tons, Hartford, Conn., Hartford Electric Light Co. unit, to Joseph T. Ryerson & Son, Inc., Cambridge, Mass., through Stone & Webster Engineering Corp., Boston, contractor.

300 Tons, Pittsburgh, United Drug Co. building, to L. J. Lind Co., Pittsburgh; Mellon-Stuart, contractor.

300 Tons, East Bevon, Conn., building for Connecticut Light & Power, to Bethlehem Steel Co., Bethlehem, Pa., through United Engineers & Constructors, Philadelphia.

263 Tons, Monessen, Pa., requirements of Monessen Coal & Coke Co., to Truscon Steel Co., Youngstown, through Rust Engineering Co., Pittsburgh.

219 Tons, Weathersfield, Conn., bridge, to Truscon Steel Co., Youngstown, through Mariani Construction Co., New Haven, Conn.

150 Tons, Irvington, N. J., defense project, to Truscon Steel Co., New York; Lord & Burnham Co., Irvington, contractor.

175 Tons, Westfield-Chicopee, Mass., road, to Bethlehem Steel Co., Bethlehem, Pa., through Dan O'Connell Sons, Inc., Holyoke, Mass., contractor.

150 Tons, Philadelphia, Navy Yard structural assembly shop, to Bethlehem Steel Co., Bethlehem, Pa.; Hughes-Foulkrod Co., contractor.

129 Tons, Providence, R. I., U. S. Engineers Invitation 699-41-195, to Bethlehem Steel Co., Bethlehem, Pa., through Congdon & Carpenter Co.

100 Tons, Ithaca, N. Y., Olin Hall, Cornell University, to Truscon Steel Co., New York; John Lowry, New York, contractor.

100 Tons, Newport, R. I., housing project, to Morrison-Stevens, Boston, through M. Spinelli & Sons, Inc., Boston, contractor.

100 Tons, Berlin, Conn., Gross & De Leeuw Machine Co. shop, to Northern Steel Co., Boston.

SOUTH AND CENTRAL

6000 Tons, St. Louis, Western Cartridge Co. and McQuay-Norris Co. plants, to Laclede Steel Co., St. Louis; Fruins-Colnon & Massman Co., contractor.

5500 Tons, Bynum, Ala., Government arsenal, tonnage distributed to Truscon Steel Co., Youngstown; Concrete Steel Co., Chicago; Alabama Steel Co.; Virginia Steel Co., Richmond, Va.; Ceco Steel Products Co., Jersey City, N. J.; Connors Steel Co., Birmingham.

1500 Tons, Childersburg, Ala., du Pont plant, to Virginia Steel Co., Richmond, Va.

1000 Tons, Elwood, Ill., additional tonnage for ammunition loading plant, to Joseph T. Ryerson & Son, Inc., Chicago.

616 Tons, Euclid, Ohio, building for Thompson Aircraft Corp., to Truscon Steel Co., Youngstown, Ohio.

600 Tons, Norfolk, Va., Naval operating base additional facilities, to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.; Doyle & Russell Co., contractor.

400 Tons, Jefferson City, Mo., hotel, to Missouri Rolling Mill Corp., St. Louis; Brunson Construction Co., contractor.

400 Tons, Charleston, S. C., Naval ammunition depot, to Truscon Steel Co., Youngstown, through C. M. Guest & Sons.

303 Tons, Chanute Field, through State Procurement Office, to Ceco Steel Products Co., Cicero, Ill.

162 Tons, Des Moines, Iowa, Marquette Cement & Mfg. Co. requirements, to Truscon Steel Co., Youngstown, through A. H. Neuman & Bros., Inc.

WESTERN STATES

5000 Tons, Permanente, Cal., magnesium plant, to Bethlehem Steel Co., San Francisco.

2500 Tons, San Francisco, Union Square garage, to Bethlehem Steel Co., San Francisco, through MacDonald & Kahn, San Francisco, contractor.

1327 Tons, Los Angeles and Wilmington, Cal., Department of Water and Power list (Specification 3735), to Truscon Steel Co., Los Angeles.

250 Tons, Monterey, Cal., WPA requirements for Fort Ord, to Truscon Steel Co., Youngstown.

217 Tons, Davis, Cal., four State highway bridges, to Gilmore Fabricators, Inc., San Francisco, through A. Soda & Son, Oakland, Cal., contractor.

121 Tons, Bellflower, Cal., San Gabriel River bridge, to Blue Diamond Corp., Los Angeles, through Warner & Webb, Los Angeles, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1000 Tons, Boston, Roxbury district, housing project.

1000 Tons, East Boston, housing project.

778 Tons, Johnstown, Pa., flood protection, section No. 6.

600 Tons, Brooklyn, Brooklyn-Battery Tunnel, contract No. 5.

440 Tons, Confluence, Pa., Youghiogheny Dam embankment and spillway; bids May 2.

400 Tons, Hartford, Conn., Hartford Electric Light Co., generating station addition; Stone & Webster Engineering Corp., contractor.

300 Tons, Pittsburgh, United Drug Co. warehouse.

140 Tons, Sutton, Mass., State highway bridges.

SOUTH AND CENTRAL

1200 Tons, Weldon Springs, Mo., Atlas Powder Co. TNT and DNT plant.

1000 Tons, Sandusky, Ohio, Plum Brook ordnance plant; E. B. Badger & Sons Co., Boston, contractor.

700 Tons, Ypsilanti, Mich., Ford Motor Co. airplane parts factory; bids taken.

250 Tons, Chicago, utility building for Commonwealth Edison Co.

200 Tons, Portage County, Ohio, State project No. 28; bids are in.

160 Tons, Delaware County, Ohio, State project No. 26; bids are in.

150 Tons, Wausau, Wis., store building, Sears-Roebuck & Co.

143 Tons, Columbus, Ind., State highway project No. 2139.

120 Tons, Langley Field, Va., airplane model testing basin.

105 Tons, Athens County, Ohio, State project No. 25; bids are in.

100 Tons, Chicago, Hines Hospital addition; bids May 6.

WESTERN STATES

950 Tons, San Diego, Cal., Navy dry dock at destroyer base; Pacific Bridge Co., contractor.

125 Tons, Pateros, Wash., Bureau of Reclamation (Invitation C-38,316-A); Bethlehem Steel Co., San Francisco, low bidder.

Pipe Lines

Tennessee Gas & Transmission Co., Chattanooga Bank Building, Chattanooga, Tenn., Curtis B. Dall, president, is making surveys for new welded steel pipe line from gas field in Louisiana to Chattanooga and other points in State for natural gas transmission; also line extension to Asheville, N. C. Gas will be furnished to different utilities and municipalities along route for local distribution. Cost close to $20,000,000 with booster stations and other operating facilities.

Pine Mountain Fuel Gas Corp., Barbourville, Ky., has awarded contract to Flori Pipe Co., 601 East Red Bud Avenue, St. Louis, for steel pipe for new line from Hilmer gas field, Knox County, Ky., to Middlesboro, Ky., about 18 miles, for natural gas transmission; also for pressure pipe for distribution system at latter place. Cost close to $360,000 with control house, meter station and other operating facilities.

Hyattsville Gas Co., Hyattsville, Md., plans pressure pipe lines from connection with local system to Seabrook and Lanham, where it is proposed to furnish service.

Constructing Quartermaster, Camp Edwards, Falmouth, Mass., has low bid from Aqua Systems, Inc., 385 Gerard Avenue, New York, at $27,862 for installation of pressure pipe line system for gasoline fueling at local camp.

King County Water District, Riverton Heights, near Seattle, care of Parker & Hill, Smith Tower Building, Seattle, consulting engineers, will take bids soon for about 9000 ft. of 6 and 4-in. steel or cast iron water pipe for water system in district.

Heim & Siegel, 327 Cherry Street, Montoursville, Pa., J. A. Heim, in charge, plans pipe lines in connection with development of natural gas properties in Steuben County gas field, near Hornell, N. Y., where wells will be drilled. Cost over $50,000.

Bureau of Reclamation, Denver, has opened bids on 500,000 ft. of 1-in. outside diameter black steel pipe or tubing for delivery at Friant, Cal., under Specification 48,808-A (Friant Dam); also couplings and gaskets.

Cast Iron Pipe

Hartford, Conn., has awarded 500 tons of 6 to 16-in. pipe to Warren Foundry & Pipe Corp.

Massachusetts Metropolitan Water District has awarded 383 tons of pipe ranging up to 36-in., and 159 tons of castings to United States Pipe & Foundry Co.

Lexington, Mass., is in the market for a $40,000 water loan and has placed several carlots of pipe with Warren Foundry & Pipe Corp.

Carrollton, Mo., will close bids May 8 for pipe lines for water system and other waterworks installation, including water softener equipment. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Meridian, Miss., has awarded contract to American Cast Iron Pipe Co., Birmingham, at $29,586, for 24-in. pipe and fittings for new main supply line from reservoir in mountain area to connection with city lines.

Washington Suburban Sanitary Commission, Hyattsville, Md., plans pipe line extensions in water system near Laurel, Md., connecting with present station at Branchville. Cost about $1,167,200 including new filter plant for Willis school district, near Laurel; also plans new water reservoir and pumping station on Patuxent River for additional water supply source, including pipe lines for connection with present main line. Cost about $1,388,000. Work is scheduled to begin early in summer.

Sidney, N. Y., plans pipe line extensions in water system and other waterworks installation. Whitman, Requardt & Smith, 11 North Pearl Street, Albany, N. Y., are consulting engineers.

McIntosh, Minn., closes bids May 5 for pipe line extensions in water system, including fittings, valves, etc. A. W. Hawkinson, Detroit Lakes, Minn., is consulting engineer.

Renton, Wash., plans 4-in. pipe for extensions in water system in Burnett Street. Willis McCracken is city engineer in charge.

Cincinnati, C. O. Sherrill, city manager, has awarded contract to United States Pipe & Foundry Co., East Burlington, N. J., at $42,588 for requirements of cast iron pipe for water system up to March 31, 1942.

Water Department, Tampa, Fla., has received low bids as follows for extensions in water system: New 36-in. main line from pumping plant on Hillsborough River to connection with city lines, from Langston Construction Co., Orlando, Fla., cast iron pipe, at $455,000; Cone Brothers Contracting Co., Tampa, Fla., tendered bid at $454,000 for same line using concrete pipe; new 24-in. line from connection with new 36-in. line, noted, to Bay-to-Bay Boulevard, crossing Hillsborough River, from Langston company, mentioned, at $323,200, using steel pipe; J. B. McCrary & Co., Atlanta, Ga., tendered bid at $329,811 for same line, using cast iron pipe; pipe lines for water system in West Tampa, Interbay, Central Heights, Jackson Heights and vicinity, from Boyce Co., Clearwater, Fla., at $673,600; Langston company tendered figure of $787,900 for same lines, all cast iron pipe. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / ↓ Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			Detroit = 2.70¢						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1⅛ to 1½ in. inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller		68
½ in. and smaller	66	..
½ in. through 1 in.		64
9/16 to 1 in.	63	..
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Stove bolts in packages, with nuts attached 71

Stove bolts in bulk 80

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	68
Upset set screws, cup and oval points	74
Milled studs	59
Flat head cap screws, listed sizes	43
Filister head cap screws, listed sizes	56

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 23	Apr. 24	Apr. 25	Apr. 26	Apr. 28	Apr. 29
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	52.375	52.25	52.125	....	51.75	51.75
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	52.75	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	9.10
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	32.00	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy crucible	10.375	11.00
Hvy. and wire	9,375	9.775
Light and bottoms	8.375	8.875
Brass		
Heavy	6.125	6.625
Light	5.125	5.875
No. 1 yel. turn	5.875	6.375
No. 1 red or compo. turnings	9.125	10.125
Hvy. Mach. compo.	9.50	9.725
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11.00-12.00	
Sheet	12.00-13.50	
Zinc	5.10	

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York: American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $180-$182, per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem $54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade ..... 3.50c.

ARMSTRONG

In Knurling it's the TOOL that counts

There are operations where extreme skill can make up for deficiencies in tools, but not so with knurling. Even in the hands of the most skilled operator, unevenness in pressure, dullness of knurl edges or faults in the pattern will reproduce in the knurling. On the other hand even the greenest apprentice will turn out clean-cut "sparkling" knurling with an ARMSTRONG Knurling Tool. Self-centering, with the entire head bearing on a large knuckle joint that absorbs both end and side thrust without "springing," this tool automatically equalizes the pressure on top and bottom knurls, and holds them in close alignment. ARMSTRONG Knurls, being hob-cut, make a perfect pattern—clean, sharp and uniform. Coming in Coarse, Medium and Fine in both Diamond and Straight patterns, they are machined from high carbon steel, heat treated, tempered and tested.

If your knurling is mediocre, correct it now by calling your nearest supply house for ARMSTRONG Knurling Tools and ARMSTRONG Hob-cut Knurls.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave., Chicago, U. S. A.

Eastern Warehouse & Sales: 199 Lafayette St., N. Y.

Buy ARMSTRONG Tools from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Introducing—
TWO NEW NON-CORROSIVE
ALLOYS

● **Super B&M METAL**

—Super B & M Metal Is Improved Aluminum Bronze.

● **Stainless B&M METAL**

—Stainless B & M Metal is a high Nickel Alloy—containing approximately 30% nickel.

PHYSICAL QUALITIES OF HOT ROLLED AND FORGED

	SUPER B&M METAL	STAINLESS B&M METAL
Diameter of Bar	.505	.505
Area	.2003	.2003
Yield Point, lbs. per sq. in.	55830	74800
Tensile Strength, lbs. per sq. in.	91700	91580
Elongation in 2"	38.5%	28.5%
Reduction of Area	46.7	70.8
Fracture	¾ Cup	¾ Cup
Specific Gravity	7.75	8.85
Weight per Cubic Inch	0.280	0.320

BOTH ARE AVAILABLE IN HOT ROLLED BARS — STRIP — FORGINGS — BILLETS — CASTINGS

WRITE TODAY FOR COMPLETE BOOKLET

WHEELING BRONZE CASTING CO.

WHEELING, W. VA.

ORES

Lake Superior Ores
Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%...	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*
C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
African, Indian, 44 to 48% Mn.	57c. to 61c.
African, Indian, 49 to 51% Mn.	60c. to 65c.
Brazilian, 46 to 48% Mn...	54c. to 59c.
Cuban, del'd, duty free, 51% Mn.	67½c. to 71c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered....	$23 to $24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade).. ..	Nom.
Rhodesian, 45%	$25.00
Rhodesian, 48%	$28.00 to $30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill	
Standard rails, heavier than 60 lb., gross ton.....	$40.00
Angle bars, 100 lb.....	2.70
F.o.b. Basing Points	
Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel.....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail...	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines...	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*	
Super-duty brick at St. Louis..	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton ...	7.10
Silica Brick	
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55
Chrome Brick *Net per Ton*	
Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	
Magnesite Brick	
Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00
Grain Magnesite	
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

Therm-O-flake
INSULATION BRICK

One of lightest insulation brick available—(about one pound each).

Has low thermal conductivity, and is most economical for efficient insulation.

Can be compacted without breaking and cuts easily.

Especially valuable for back up work behind fire brick walls.

Acts as expansion cushion between furnace walls and binding structure.

●

Write for Information and Prices

Other **Therm-O-flake** Products
Made from Exfoliated Vermiculite
Granules - Brick - Block - Concrete

Illinois Clay Products Company
JOLIET, ILL.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... ... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed..... 87.00*
75% (carload lots, bulk).....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

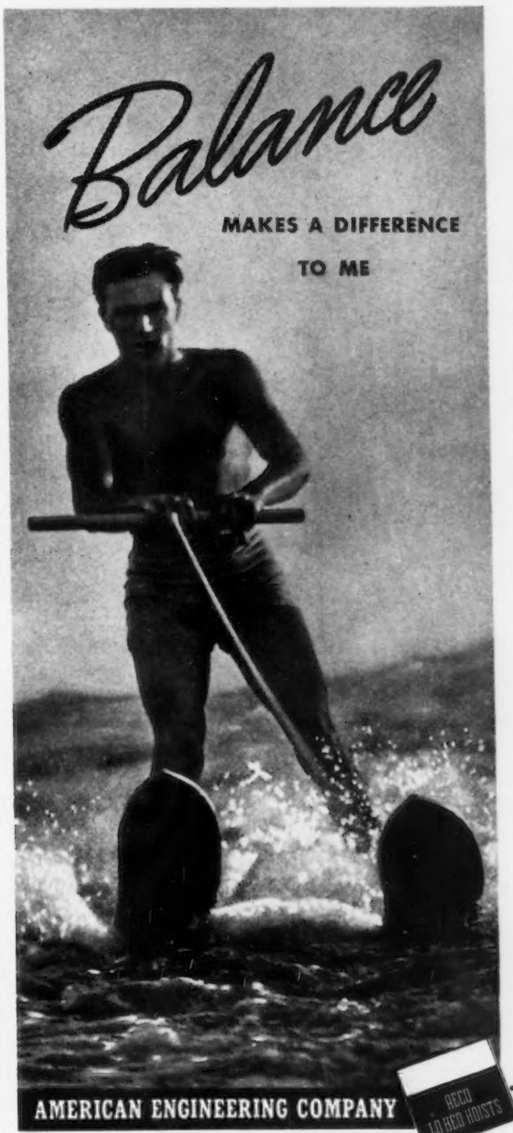
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville 75.00

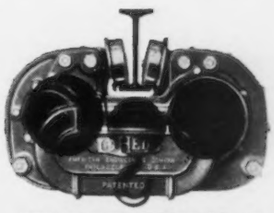
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J... ..4.70c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.50c.
No. 4 industrial, del'd Cleveland.5.25c.
No. 5 indus., del'd Cleveland...5.125c.
No. 6 indus., del'd Cleveland...4.875c.





BALANCE MAKES A DIFFERENCE IN HOISTS

LO-HED, the *Balanced* Hoist. For years men have noticed that they could spot a Lo-Hed electric hoist immediately. "It looks different," they said. Well, it is different. Unlike any other hoist, the Lo-Hed is built right around the beam, with the motor and drum on opposite sides of the beam, hook suspended directly below beam center. The unique construction of the Lo-Hed hoist achieves low headroom, gives you an efficient spur-gear drive, maximum accessibility, and a sturdy construction noted for its low upkeep. A Lo-Hed hoist is worth a few dollars more. Buy a Lo-Hed for low operating and maintenance costs. Write for Lo-Hed catalog today.

LOOK AT THE BALANCED LO-HED!

It Costs Less To Operate—All gears are efficient stub-tooth spur gears running in a sealed oil bath . . . gear shafts and trolley wheels are equipped with heavy-duty ball or roller bearings.

It Costs Less To Maintain — Sturdy construction . . . seldom, if ever, requires removal from rail . . . covers of controller, motor, drum and gearing are easily removed.

It's Safe—Factor of safety of over 5 at full capacity . . . 100% Positive Automatic Stop when load reaches upper limit . . . Automatic Holding Brake prevents load from drifting when current is shut off . . . short, strong shafts minimize torsional stresses.

It's Protected—Controller is fire, dust and moisture proof . . . motor totally enclosed . . . gearing sealed in . . . motor and drum covered by easily removable covers.

The Lo-Hed Hoist Is Applicable To Any Monorail System. There's A Balanced Lo-Hed Electric Hoist For Every Purpose

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.

AMERICAN ENGINEERING CO.
2410 Aramingo Avenue, Philadelphia

☐ Please send me your complete catalog of LO-HED HOISTS.
☐ Ask your representative to get in touch with me promptly.

Name .....
Company .....
Street Address .....
City..... State.....
(Please print plainly)

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	$5.50 to $5.75
Foundry, f.o.b. Connellsville, prompt	$6.00 to $6.50
F'dry, by-product, Chicago	10.50
F'dry, by-product, New England	13.00
Foundry, by-product, Newark or Jersey City	$11.30 to $11.90
F'dry, by-product, Philadelphia	11.63
F'dry, by-product, Cleveland	11.55
F'dry, by-product, Cincinnati	11.00
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	$10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export	£29 16s. 3d.
Tin plate, per base box	32s. to 33s.
Steel bars, open hearth	£16 10s.
Beams, open hearth	£19 10s.
Channels, open hearth	£19 10s.
Angles, open hearth	£15 10s.
Black sheets, No. 24, gage	£22 5s. max.* £22 5s. min.**
Galvanized sheets, No. 24 gage	£25 12s. 6d. max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	.....
Brooklyn	***27.50***	.....	.....	***28.00***	.....
Jersey City	***26.53***	***26.03***	***27.53***	***27.03***	.....
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	29.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	.....
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	.....
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	.....
St. Louis	***24.50***	***24.02***	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	***26.63***	.....	***27.13***	***26.63***	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	20.38	19.00	25.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE		CHARCOAL	
Valley or Pittsburgh fce.	$23.50	Lake Superior fce.	$27.00
		Delivered Chicago	30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

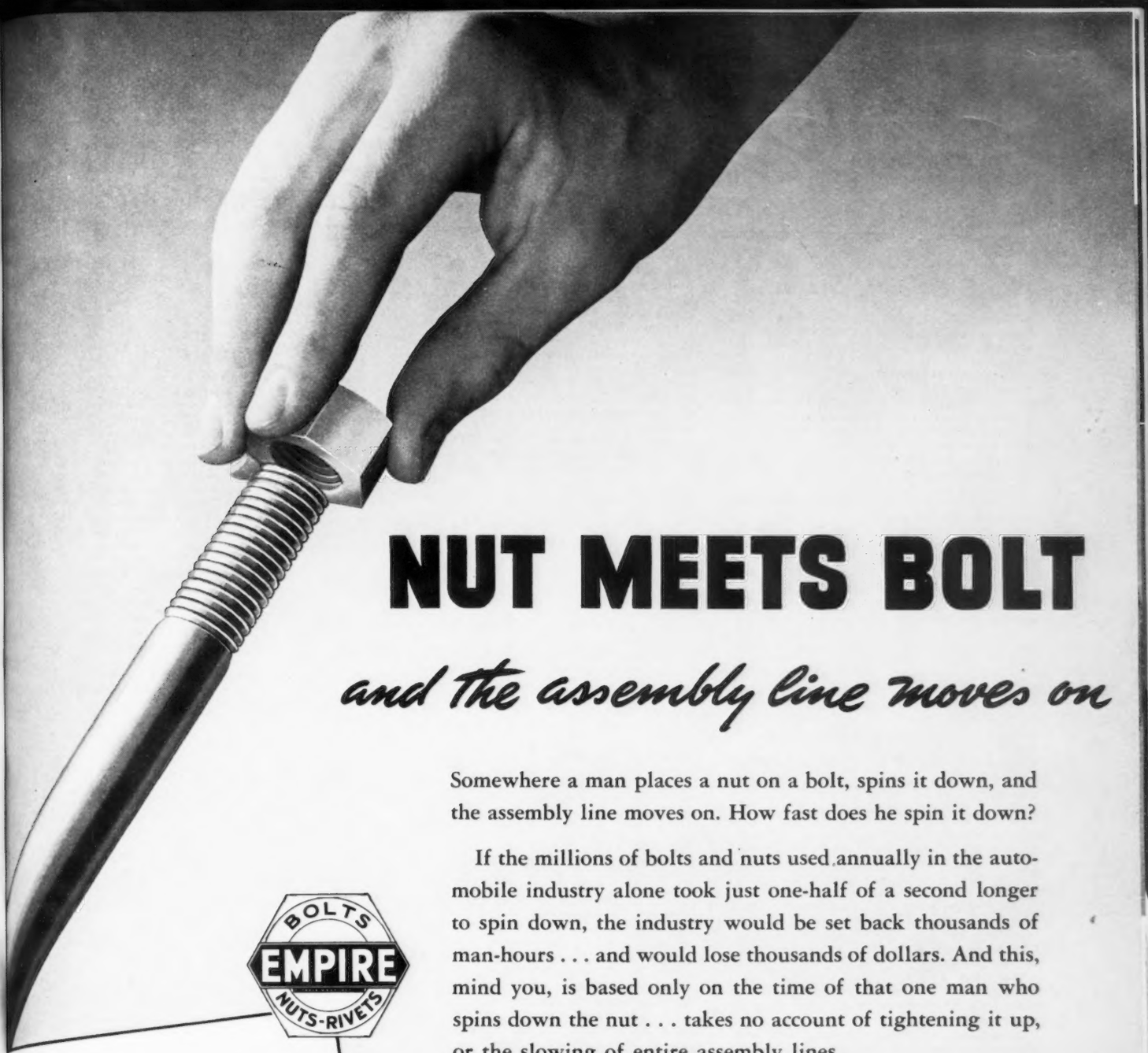
Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.23	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.64	4.75	5.11	4.75	4.24	4.75	4 98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.48*	3.82	4.06	3.70	4.99	3.65	3.73	...
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	..
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.15
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3 50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.42	7.35	7.50	....	7.72	7.45	7.58	9.55
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.45	8.40	8.63	....	8.77	8.84	8.63	10.55
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6 98	9.55

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strip, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 6 bundles. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.



NUT MEETS BOLT

and the assembly line moves on

Somewhere a man places a nut on a bolt, spins it down, and the assembly line moves on. How fast does he spin it down?

If the millions of bolts and nuts used annually in the automobile industry alone took just one-half of a second longer to spin down, the industry would be set back thousands of man-hours . . . and would lose thousands of dollars. And this, mind you, is based only on the time of that one man who spins down the nut . . . takes no account of tightening it up, or the slowing of entire assembly lines.

Think it over.

That little pair—the nut and bolt—which are so cheap and so common that you buy them by the pound, may be costing you hundreds of dollars monthly, simply because they aren't as clean of thread, as perfect of head, and as tough and hard as they ought to be.

Precision, quality, finish and strength have been the by-words of RB&W since 1845 when the manufacture of EMPIRE threaded fastenings was pioneered. Nuts and bolts *are* different . . . particularly in these times of rushed manufacturing needs.

BOLTS EMPIRE NUTS-RIVETS

BOLTS: Carriage - Machine - Lag - Plow - Stove - Elevator - Step - Tap - Wheel & Rim - Battery - U-Bolts - Tire - Automotive - Drilled - Faced - Special Heat Treated, etc. - **NUTS:** Cold Punched - Semi-Finished - Hot Pressed - Case Hardened - Slotted - Castle - Machine Screw - Marsden Lock - Low Sulphur - **RIVETS:** Standard - Tinners' - Coopers' - Culvert - Clevis and Hinge Pins - **SCREWS:** - Cap - Machine - Hanger - Sheet Metal - Phillips Recessed Head - **WASHERS:** Plate - Burrs - **MATERIALS:** Steels - Alloys - Brass - Bronze - Naval Brass - Everdur - Herculoy - and others - **RODS:** Stove - Seat - Ladder - **PLATED PARTS:** Cadmium - Zinc - Chromium - Nickel - Hot Galvanized - Copper - Tin - **SPECIAL UPSET & PUNCHED PRODUCTS.**

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **General Electric Co.**, Pittsfield, Mass., plans one-story addition, about 60 x 200 ft., for storage and distribution. Cost over $60,000 with equipment.

American Cyanamid Co., Inc., 30 Rockefeller Plaza, New York, has awarded general contract to Miller, Davis & Co., Inc., Kalamazoo, Mich., for three-story addition to branch plant at Wallingford, Conn., forming second unit of new works at that place for production of synthetic resins for plastic products manufacture. First unit, to cost close to $1,000,000 with equipment, is scheduled for completion this summer. New unit, comprising one and multi-story buildings, will cost about $800,000 with machinery. Company has plans for third and final plant unit, to cost approximately last noted figure.

Bethlehem Steel Co., Shipbuilding Division, Quincy, Mass., has let general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for two-story addition, 100 x 224 ft., at Fore River shipyard, for storage and distribution. Cost close to $100,000 with equipment.

Hodgman Rubber Co., Herbert Street, Framingham, Mass., general rubber goods, has asked bids on general contract for two-story addition, 100 x 135 ft. Cost close to $100,000 with equipment. Isador Richmond, 248 Boylston Street, Boston, is architect.

Geometric Tool Co., Blake and Valley Streets, New Haven, Conn., precision tools, has asked bids on general contract for one and two-story addition. Cost about $50,000 with equipment. Leo F. Caproni, 1221 Chapel Street, is architect and engineer.

Mack Mfg. Corp., Thirty-fourth Street and Forty-eighth Avenue, Long Island City, motor trucks and parts, plans expansion in branch plants at New Brunswick and Plainfield, N. J., and Allentown, Pa., for production of transmission control differentials and drive assemblies for Army tanks for government. Cost about $282,000. Fund of that amount will be provided by government.

Watervliet Tool Co., Inc., 1039 Broadway, Albany, N. Y., reamers, drills and kindred tools, plans one-story addition. Cost close to $50,000 with equipment.

Department of Water Supply, Gas and Electricity, Municipal Building, New York, has filed plans for new two-story pumping plant at 109-22 St. Marks Avenue, Rockaway Beach, Queens. Cost about $100,000 with pumping units and auxiliary equipment.

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to Thompson-Starrett Co., Inc., 444 Madison Avenue, New York, for one-story foundry and one-story addition to structural shop at Brooklyn Navy Yard at $1,650,000, exclusive of equipment.

Pabst-Premier Sales Co., 105 Hudson Street, New York, affiliated with Pabst Brewing Co., Milwaukee, has let general contract to Rheinstein Construction Co., 21 East Fortieth Street, New York, for one-story storage and distributing plant at Long Island City. Cost close to $80,000 with equipment. Skidmore, Owings & Merrill, 5 East Fifty-seventh Street, New York, are architects.

American Smelting & Refining Co., 120 Broadway, New York, plans new electrolytic zinc refinery at Corpus Christi, Tex., where site has been selected, comprising one and multi-story units, furnaces, storage and distributing buildings and facilities, machine shop, power house and other structures. Plant will require about 12 months for completion and will cost close to $5,000,000 with equipment.

Department of Docks, City of New York, Pier A, North River, New York, plans new seaplane hangar, with repair and reconditioning facilities, at LaGuardia Field, North Beach, Queens. Cost about $380,000 with equipment. Delano & Aldrich, 126 East Thirty-eighth Street, New York, are architects.

Eclipse Machine Division, Bendix Aviation Corp., Oakwood Avenue, Elmira, N. Y., airplane equipment, coaster brakes, parts, etc., has let general contract to John B. Pike & Son, Inc., 1 Circle Street, Rochester, N. Y., for one-story addition for a gun-testing division for government. Cost over $50,000 with equipment.

Linde Air Products Co., East Park Drive and Woodward Avenue, Tonawanda, N. Y., has approved plans for one-story addition, 80 x 260 ft. Cost close to $100,000 with equipment. Main offices are at 30 East Forty-second Street, New York.

Durez Plastics & Chemicals, Inc., Walck Road, North Tonawanda, N. Y., plastic products, plans one-story addition for increased production. Cost about $50,000 with equipment.

General Electric Co., Bloomfield, N. J., plans two-story addition, 75 x 75 ft., with one-story extension, 24 x 40 ft. Cost over $70,000 with equipment.

Watson-Stillman Co., Roselle, N. J., hydraulic machinery and parts, presses, pumps, etc., plans expansion for increased production for Government, which will provide about $185,500 through Defense Plant Corp., Washington, Federal agency, for purchase of equipment.

Board of Education, 31 Green Street, Newark, N. J., Alfred H. Krick, secretary, asks bids until May 7 for metal-working machinery, woodworking machinery, dynamometers, steel storage and filing cabinets, steel wardrobe lockers, work benches, electrical supplies and other equipment for public schools.

American Transformer Co., 172 Emmet Street, Newark, N. J., electrical transformers and parts, plans one-story addition for expansion in production department. Cost about $140,000 with equipment.

Vimalert Co., Ltd., 807 Garfield Avenue, Jersey City, N. J., marine engines and parts, has purchased three-story building at 86-92 Forrest Street, totaling 40,000 sq. ft. of floor space, and will improve for occupancy, providing increased capacity.

American Oxygen Service Co., 600 Essex Street, Harrison, N. J., has let general contract to Mahony-Troast Construction Co., 657 Main Avenue, Passaic, N. J., for one and two-story and basement addition for expansion in air and gas production departments. Cost over $200,000 with equipment.

Jones Machine Tool Works, Inc., Fifty-third Street and Lansdowne Avenue, Philadelphia, plans one-story addition. Cost over $75,000 with equipment.

Cramp Shipbuilding Co., Inc., Philadelphia, has let general contract to Charles F. Rohleder, 2134 Cherry Street, for one-story shop addition and alterations and improvements in several existing buildings. Cost over $85,000 with equipment.

Fleetwings, Inc., Bristol, Pa., airplanes and parts, through War Department, Washington, will have plans prepared by Giffels & Vallet, Inc., Marquette Building, Detroit, architect and engineer, for new plant for production of aircraft parts for government. Cost about $2,484,000 with equipment. Fund in that amount has been authorized by Defense Plant Corp., Washington, Federal agency.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has approved plans for one and two-story addition to branch works at Trafford, Pa., 65 x 125 ft., for expansion in buildings Nos. 1 and 2. Cost over $100,000 with equipment.

Fort Pitt Brewing Co., Sixteenth and Mary Streets, Sharpsburg, Pittsburgh, has asked bids on general contract for two-story addition, 80 x 200 ft., for storage and distribution. Cost over $85,000 with equipment. Herbert H. Cahoon, 337 Boulevard of Allies, Pittsburgh, is architect.

Midvale Co., Nicetown, Philadelphia, heavy forgings, castings, etc., will carry out further plant expansion for production of ordnance for government. Cost about $12,970,200, and appropriation in that amount has been authorized by government.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 5 for carbon steel pipe taps, machine type bridge reamers, 144 sets of pipe diestocks, carbon steel hand taps, steel drill sockets, machinists' vises, pipe and bench vises, 252 cutting punches, screw monkey wrenches, structural, pipe and engineers' wrenches, adjustable tap wrenches, 24 hand-power bench grinders, machinists' hammers, blacksmiths' sledge hammers, tinners' snips, hand cross-cut saws, 1848 machetes with steel blades, and other equipment (Schedule 5044).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 6 for motor-driven drill presses (Schedule 6438), instrument and variation testing boards (Schedule 6478), electric cable (Schedule 6476), 10 motor-generator sets and spare parts (Schedule 6425), anchor chain (Schedule 6412), soot blowers and spare parts (Schedule 6417); until May 13 for electric transformers (Schedule 6547) for Eastern and Western Navy yards.

The South

• **E. I. du Pont de Nemours & Co.**, Organic Chemicals Department, Rubber Chemicals Division, du Pont Building, Wilmington, Del., plans new works at or near Louisville for production of neoprene synthetic rubber. It will include storage and distributing buildings, machine shops, power house and auxiliary structures, with administration building. Cost over $5,000,000 with machinery.

Aluminum Ore Co., Inc., Mobile, Ala., has plans for new steam-electric generating station fronting on Mobile River, for service at works. It will have initial capacity of 7500-kw., with turbine-generator units and accessories, high-pressure boilers and auxiliary equipment. Cost over $1,500,000 with equipment. J. G. White Engineering Corp., 80 Broad Street, New York, is consulting engineer.

Metallurgical Products, Inc., Shreveport, La., plans expansion and installation of additional equipment for production of powdered carbonyl iron for government. Cost about $125,000, of which approximately $69,000 will be used for equipment purchases. Appropriation will be secured through Defense Plant Corp., Washington, Federal agency.

Electric Railway Equipment Co., 2900 Cormany Street, Cincinnati, railway appliances and equipment, has awarded general contract to Scott Lumber Co., 1112 Chapline Street, Wheeling, W. Va., for rebuilding part of plant in Riverview district, Wheeling, recently destroyed by fire. Cost close to $50,000 with equipment.

Atmospheric Nitrogen Corp., subsidiary of Allied Chemical & Dye Corp., 61 Broadway, New York, has closed contract with War Department, Washington, for new steam-electric generating plant on Ohio River at West Henderson, Ky., for service at Ohio River ordnance plant of government, now in course of erection at that place. Cost about $1,100,000 with turbine-generators and other equipment. Company also has award for ordnance plant for production of synthetic ammonia, to cost about $15,484,000 with machinery.

United Carbon Co., Charleston, W. Va., plans further expansion in recently completed carbon black-manufacturing plant in Mc-

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Campbell gas field, near Marshall, Tex., including installation of compressors and auxiliary equipment, boilers, etc. Cost close to $300,000.

Commanding Officer, Air Corps, Brooks Field, Tex., asks bids until May 5 for one bulldozer (Circular 4).

Universal Building Products Co., 2227 Cedar Springs Avenue, Dallas, Tex., will erect one-story addition for production of demountable steel hangar units for Air Corps, including parts manufacture and assembling. Cost close to $75,000 with equipment.

Continental Oil Co., San Antonio, Tex., has let general contract to Whitehurst Construction Co., Ponca City, Okla., for new bulk oil storage and distributing plant at Seguin, Tex., to include steel storage tanks, pumping station and other facilities. Cost over $50,000 with equipment. Main offices are at Ponca City.

Central States

• **Murray Ohio Mfg. Co.,** 1115 East 152nd Street, Cleveland, sheet metal stampings, steel toys and specialties, has let general contract to Hadlock-Krill Co., 2169 East Thirty-third Street, for two one-story additions, 57 x 112 ft., and 50 x 113 ft., for storage and distribution. Cost over $85,000 with equipment.

National Motor Bearing Co., 1100 Seventy-eighth Avenue, Oakland, Cal., oil and fluid seals, bearings, shims, etc., has acquired tract at Van Wert, Ohio, for new branch plant, with initial unit one-story, 150 x 350 ft. Cost over $100,000 with equipment. Bids will be asked soon on general contract. H. E. Beyster Corp., General Motors Building, Detroit, is architect and engineer.

American Steel & Wire Co., Rockefeller Building, Cleveland, has let general contract to National Engineering & Contracting Co., West Fourth Street and Central Avenue, for three one-story additions to local plant. Cost close to $225,000 with equipment.

John Deere Plow Co., 130 East Naughten Street, Columbus, Ohio, has let general contract to Robert H. Evans & Co., 395 East Broad Street, for one-story and basement L-shaped addition, about 104,000 sq. ft. floor space, to factory branch, storage and distributing plant at Chambers and Olentangy River Roads. Cost about $160,000 with equipment.

Cleveland Tractor Co., Euclid Avenue and East 193rd Street, Cleveland, plans one-story addition, 100 x 200 ft., for production of high-speed tractor units for Government. Cost over $85,000 with equipment.

Holland-Reiger Corp., Sandusky, Ohio, washing and ironing machines and parts, has purchased plant and business of Sweeper-Vac Co., Worcester, Mass., electric vacuum cleaners and parts. Worcester plant will be removed to Sandusky where production will be concentrated.

Wayne Pump Co., Fort Wayne, Ind., pumping equipment for service stations, etc., has let general contract to Buesching Brothers Construction Co., 219 East Berry Street, for one-story addition, 130 x 220 ft. Cost over $150,900 with equipment. Pohlmeyer & Pohlmeyer, Central Building, are architects.

Perfect Circle Co., Hagerstown, Ind., piston rings, etc., plans expansion, including installation of equipment for production of airplane parts for government. Cost about $208,850, fund to be provided by Defense Plant Corp., Washington, Federal agency.

Continental Roll & Steel Foundry Co., Railroad Avenue and East 144th Street, East Chicago, Ind., castings, rolls, machinery and parts, has let general contract to Chris Hanson Co., 604 State Line Road, Calumet City, Ill., for two-story and basement addition for storage and distribution. Cost close to $60,000 with equipment. William S. Hutton, 5231 Hohman Avenue, Hammond, Ind., is architect.

Water Department, 414 East Twelfth Street, Kansas City, Mo., Kenneth K. King, director, plans new central maintenance, storage and distributing plant and yard for waterworks equipment, motor trucks, etc., comprising one-story building, with machine shop, automobile service shop and other mechanical departments. Entire project will cost about $350,000, building and equipment to represent about $250,000 of that amount. Bids on general contract are scheduled to be asked early in June.

American Chain & Cable Co., 400 West Madison Street, Chicago, welded and weldless chain, malleable castings, etc., has leased one-story building, about 57 x 75 ft., at 800 East Central Street, Wichita, Kan., for branch assembling plant.

Coca-Cola Bottling Co., 309 E Street, Lawton, Okla., has let general contract to A. C. Shelton & Son, Lawton, for new one-story mechanical-bottling, storage and distributing plant, 100 x 115 ft., at 507-11 North Second Street. Cost close to $100,000 with equipment. Henry A. Gaines, Public Service Building, Asheville, N. C., is architect.

Santa Fe Railway Co., Topeka, Kan., J. H. Armstrong, superintendent of shops, will take bids soon on general contract for one-story addition to local car and locomotive repair shops, 165 x 250 ft. A 15-ton traveling crane and other mechanical-handling equipment will be installed. Cost close to $100,000 with equipment. Engineering department, 80 East Jackson Boulevard, Chicago, is in charge.

Precision Boring Co., 2800 East Vernor Street, Detroit, has asked bids on general contract for new one-story plant, 95 x 126 ft., at Erwin Avenue and Lynch Road. Cost over $80,000 with equipment. Otis Winn, 13700 Woodward Avenue, is architect.

Midland Steel Products Co., 6660 Mt. Elliott Avenue, Detroit, automobile stampings, pressed steel parts, etc., has let general contract to Barton Malow Co., 1900 East Jefferson Street, for one-story addition, 75 x 345 ft., for expansion in machine shops and press department. Cost about $175,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is architect and engineer.

Fuller Mfg. Co., Inc., Kalamazoo, Mich., gears, transmissions, etc., has asked bids on general contract for one-story addition. Cost about $50,000 with equipment. Stewart-Kingscott Co., Kalamazoo, is architect.

Bell & Gossett Co., 3000 South Wallace Street, Chicago, domestic heating systems and equipment, has asked bids on general contract for new one and two-story plant, 150 x 325 ft., at Morton Grove, Ill. Cost close to $150,000 with equipment. Danely & Wedemeyer, Urbana, Ill., are architects.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., has low bid from Preister Construction Co., Davenport Bank Building, Davenport, Iowa, at $196,900, for one-story heat-treating and forge shop, 120 x 300 ft., exclusive of equipment.

A. W. Cash Valve Mfg. Corp., Decatur, Ill., has let general contract to R. W. Christy, Decatur, for one-story addition. Cost close to $70,000 with equipment.

Supreme Metal Treating Co., 133 West Bruce Street, West Milwaukee, has let general contract to Ray Stadler Construction Co., 2617 North Ninetieth Street, Wauwatosa, Wis., for new one-story plant on West Mitchell Street. Cost close to $45,000 with equipment.

Board of Trustees, Municipal Electric Light and Power Plant, Manning, Iowa, asks bids until May 12 for extensions and improvements, including new 750-bhp., diesel engine-generating unit and auxiliary equipment. Cost about $70,000. Buell & Winter Engineering Co., Insurance Exchange Building, Sioux City, Iowa, is consulting engineer.

California Canning Co., Sleepy Eye, Minn., food canner and packer, has let general contract to C. C. Pagenhart, 217 South Broadway, Rochester, Minn., for two-story addition, 65 x 175 ft. Cost about $85,000 with equipment.

Manitowoc Shipbuilding Co., Manitowoc, Wis., plans one-story addition for a machine and pipe shop. Cost over $60,000 with equipment.

Burgess-Norton Mfg. Co., Inc., Peyton Avenue, Geneva, Ill., screw machine products, automobile parts, etc., has let general contract to August Wilson, 202 North Fourth Street, for one-story addition, 50 x 150 ft. Cost close to $50,000 with equipment.

Western States

• **Freuhauf Trailer Co. of California, Inc.,** South Boyle Avenue, Vernon, Los Angeles, plans one-story addition, 50 x 200 ft., for storage and distribution. Cost over $80,000 with equipment. W. M. Bostock, 6221 Pacific Boulevard, Huntington Park, Cal., is engineer.

Western Pipe & Steel Co., Inc., 200 Bush Street, San Francisco, plans two new shipways at shipbuilding plant, South San Francisco, with one-story shops and other structures. Cost over $500,000 with equipment.

Martinac Shipbuilding Corp., 1404 East D Street, Tacoma, Wash., has let general contract to Industrial Engineers & Contractors, Inc., 711 Middle Waterway, for one-story structural and mechanical shop, 115 x 156 ft. Cost close to $90,000 with equipment.

Ohio Ferro Alloys Corp., Canton, Ohio, has selected new site on Taylor Way for proposed branch plant at Tacoma, Wash., and will relinquish land previously secured on Alexander Way. General contract has been let to Roy T. Earley, 418 North Eleventh Street, Tacoma, for initial units, comprising main furnace building, 70 x 110 ft., and 80 ft. high, and three smaller structures. Contract for electric power has been made with municipal power plant. Cost about $250,000 with equipment.

Pelton Water Wheel Co., Eighteenth and Harrison Streets, San Francisco, hydraulic turbines and parts, and other mechanical equipment, has let general contract to H. C. Vesano Co., 251 Kearny Street, for one-story addition to main works. Cost close to $85,000 with equipment.

Novelty Carriage Works, Inc., 817 Second Street, Spokane, Wash., automobile bodies, motor truck bodies, parts, etc., plans new one-story plant, 150 x 250 ft., on Apple Way, near city limits, for parts production and assembling. Proposed to carry out work during summer. Cost over $100,000 with equipment.

Canada

• **Canadian Power Boat Co., Ltd.,** St. Patrick Street, Montreal, motor boats, parts, etc., plans one-story shop addition. Cost about $70,000 with equipment. T. Pringle & Son, Ltd., 485 McGill Street, is architect and engineer.

Gravette Boats, Ltd., Gravenhurst, Ont., plans expansion in shipbuilding plant, including one-story structural and mechanical shops. Cost close to $75,000 with equipment.

Ontario Steel Products Co., Ltd., 81 St. George Street, Chatham, Ont., has approved plans for one-story addition, 60 x 150 ft., superstructure to be placed under way at once. Cost over $85,000 with equipment.

Saanich, B. C., municipal council, has plans by H. H. Allen, municipal engineer, for waterworks system to cost $350,000, including pumping equipment.

Maple Leaf Milling Co., Ltd., 68 Yonge Street, Toronto, Ont., has awarded general contract to MacDonald Engineering Co., Ltd., C.P.R. Building, for $100,000 addition to grain elevator on Junction Road. N. B. Thomsen is engineer.

Canadian Car & Foundry Co., Ltd., 29 Lansdowne Avenue, Amherst, N. S., plans to start work immediately on an airplane plant to cost $200,000.

Lion Grinding Wheels, Ltd., Pearl Street East, Brockville, Ont., will build plant addition to cost about $50,000 with equipment. Walter Patterson, 35 William Street, is general contractor.

Cochrane Tool & Machine Co., Robert Cochrane, 1 Royal Street, York Township, Ont., has awarded general contract to C. Sheehan, 163 Vine Street, Toronto, for plant addition at Leaside, Ont., to cost about $50,000 with equipment. Hank & Irwin, 2890 Bloor Street West, Toronto, are architects.

Department of Munitions and Supply, Ottawa, has awarded general contract to Sorel Steel Industries, Ltd., Sorel, Que., for construction of defense project in Province of Quebec, to cost $233,280.